Annual Report on Evaluation, Measurement & Verification Findings for KCP&L – Greater Missouri Operations (GMO) Company Program Year 2014

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Definition of Key Acronyms

As a first step to detailing the evaluation methodologies, the evaluators provided a glossary of terms:

- C&I – Commercial and Industrial
- CAC – Central air conditioner
- CFL – Compact fluorescent lamp
- CDD – Cooling degree days
- Deemed Savings – A savings estimate for homogenous measures, in which an assumed average savings across a large number of rebated units is applied
- DLC – Residential direct load control
- ECM – Energy conservation measure
- EFLH – Equivalent full load hour
- EISA – Energy Independence and Security Act of 2007
- EM&V – Evaluation, measurement and verification
- *Ex Ante* – A program parameter or value used by implementers/sponsoring utilities in estimating savings before implementation
- Expected Savings - The saving calculated by the implementation contractor. These numbers are developed prior to the evaluator's analysis.
- *Ex Ante* Net Savings = *Ex Ante* Gross Savings x *Ex Ante* Free Ridership Rate
- *Ex Post* – A program parameter or value as verified by the Evaluators following completion of the evaluation effort
- *Ex Post* Net Savings = *Ex Post* Gross Savings x *Ex Post* Free Ridership Rate
- FAQ – Frequently asked questions
- Free Ridership – Percentage of participants who would have implemented the same energy efficiency measures in a similar timeframe absent the program.
- Gross Savings – Energy savings as determined through engineering analysis, statistical analysis, and/or onsite verification
- Gross Realization Rate = Ratio of *Ex Post* Gross Savings / *Ex Ante* Gross Savings
- HDD – Heating degree days
- HP – Heat pump
- HVAC – Heating, ventilation, and air conditioning
- ICF – ICF International
- ISR – In–service rate
- kW – Kilowatt
- kWh – Kilowatt-hour
- M&V – Measurement and verification
- MW – Megawatt
- MWh – Megawatt hour
- Net Realization Rate = Ratio of *Ex Post* Net Savings / *Ex Ante* Net Savings
- Net Savings –Gross savings factoring off free-ridership and adding in spillover.
- NTG – Net-to-gross
- NTGR – Net-to-gross-ratio = (1 – Free Ridership % + Spillover %), also defined as Net Savings / Gross Savings
- POP – Point-of-purchase
- QA – Quality assurance
- QC – Quality control
- ROI – Return on investment
- RR – Realization rate

- Realized Savings or Achieved Savings- The savings that have been verified by the EM&V contractor. This includes adjustments for equipment that may not have been installed, calculation errors, and differences in assumptions.
- Spillover – Savings generated by a program that are not incentivized.
- T&D – Transmission and distribution
- TRM – Technical Reference Manual
- VFD – Variable Frequency Drive

Executive Summary

As a result of the Missouri Public Service Commission's (PSC) approval of a Stipulation and Agreement in Case No. EO-2012-0009 and its *Report and Order* in Case No. ER-2012-075, KCP&L Greater Missouri Operations (GMO) launched 16 demand-side management (DSM) programs on or after January 26, 2013. GMO is required to complete process and impact evaluations[1] to assess the progress of its DSM programs towards meeting the annual energy and demand savings targets[2] established by the PSC for these programs.

To meet these requirements, GMO contracted with Navigant Consulting, Inc. (Navigant) to conduct comprehensive evaluation, measurement and verification (EM&V) of its 16 DSM programs during the three-year period 2013-2015 (Navigant PY2014 EM&V Report, p. xv).

As presented in the three-year EM&V Plan[3], Navigant developed a multi-year evaluation strategy to provide GMO and stakeholders with the best information possible over the course of the MEEIA programs within the available evaluation financial resources.[4] Navigant's plan generally concentrates on those programs with the greatest contribution to overall portfolio savings.

Navigant's impact evaluation activities begin with a comprehensive data and engineering review in year one to establish a database system that accurately tracks *ex ante* savings to serve as a foundation for focused measurement and verification research in years two and three. Evaluation activities are concentrated on those programs accounting for the largest portion of overall portfolio program savings to be most efficient with evaluation resources. For net-to-gross (NTG) and process evaluation, year one focused on establishing processes, including trade ally panels and fast-feedback surveys, for collecting data to provide GMO with on-going, directional information. As proposed by Navigant and agreed upon by stakeholders, net-to-gross ratios for each program will be developed over the course of the three-year evaluation cycle and will not be finalized until after the third program year (Navigant PY2013 EM&V Report, pp. viii-ix).

[1] 4 CSR 240-20.093(7) and 4 CSR 240-3.163(7)

[2] 4 CSR 240-20.094(3)(A).

[3] Evaluation, Measurement, and Verification Plan: GMO Energy Efficiency and Demand Response Program 2013-2015 prepared by Navigant. October 2013.

[4] Approximately five percent of the 3-year MEEIA programs' budget of $13,944,367 will be spent on EM&V.

The goal of these evaluations is to comply with the requirements of Section 4 CSR- 240-22.070(8):[5]

> *"The purpose of these evaluations shall be to develop the information necessary to evaluate the cost-effectiveness and improve the design of existing and future demand-side programs and demand-side rates, to improve the forecasts of customer energy consumption and responsiveness to demand-side programs and demand-side rates and to gather data on the implementation costs and load impacts of demand-side programs and demand-side rates for use in future cost-effectiveness screening and integrated resource analysis" (p. 18).*

In 2012, the PSC contracted with Johnson Consulting Group, LLC, to serve as its EM&V Auditor[6] (Auditor) to review and comment on compliance with 4 CSR 240-22.070(8) and on the overall quality, scope and accuracy of the Navigant report. The EM&V Auditor Team members' roles and responsibilities are summarized in Table E-1.

Table E-1: Roles and Responsibilities of the EM&V Auditor's Team

Member	Role	Primary Areas of Responsibility
Dr. Katherine Johnson	Project Manager	Overall Report and Process Evaluations Review and Analysis
Mr. Scott Dimetrosky	Subject Matter Expert: Lighting and Market Effects	Residential Programs Review, NTG and Market Effects Model Review, Statistical Review and Analysis
Dr. Jim Bradford	Subject Matter Expert: M&V Issues and TRM	C&I Programs Review, Demand Response Programs Review, Impacts Summary Review,
Ms. Gwen Mizell and Ms. Michelle Wynne	Principle Investigators	Review Residential Impact Findings and Cost-Effectiveness Review

The EM&V Auditor Team completed its review and assessment of the Navigant report in several ways. The Team reviewed the report's key findings, recommendations, and analytical techniques. Next, the key findings and recommendations were organized by topic areas to identify high-level themes and draw conclusions about the overall progress of the Ameren Missouri's program portfolio.

Based on this review, the EM&V Auditor Team developed both short-term and long-term recommendations on ways to improve the EM&V and evaluation reporting processes. These analyses and the recommendations for improvement are based on the EM&V Auditor Team's collective experience with utility energy efficiency programs, EM&V best practices and professional judgment.

[5] A more complete citation of the requirements of 4 CSR 240-22.070(8) is in the Introduction section of this Report.

[6] 4 CSR 240-20.093(7) Evaluation, Measurement, and Verification (EM&V) of the Process and Impact of Demand-Side Programs. Each electric utility shall hire an independent contractor to perform and report EM&V of each commission-approved demand-side program in accordance with 4 CSR 240-20.094 Demand-Side Programs. The commission shall hire an independent contractor to audit and report on the work of each utility's independent EM&V contractor.

Overall Conclusions

Navigant's EM&V Report was significantly improved from last year for both the impact and process evaluations. The findings were clearly stated and the basis of each recommendation was linked to the EM&V findings. More importantly, the impact evaluations for each program identified and corrected significant errors in the program database tracking system, which led to increases in savings for some programs, such as the Income-Eligible Weatherization Program.

The net-to-gross (NTG) approaches, overall, were exemplary, but the estimates of spillover appear high. The NTG methods and overall logic were extremely well designed, analytically sound, and clearly presented. The research employs best practices through the use of "real time" (fast feedback) data collection, year-end surveys to capture spillover, incorporation of both customer and trade ally perspectives, both quantitative and qualitative indicators of program influence, consistency checks, and sensitivity analysis to test different algorithm structures. The trade ally non-participant spillover (NPSO) estimates, however, were quite high, so much so that the analysis was forced to assume that NPSO was only limited to the survey respondents, and the trade allies that did not respond to the survey all had zero NPSO. The text implies that, at least for some programs, the NPSO may have come from non-KCP&L customers, in which case the NPSO energy savings should not be claimed by the programs.

Recommendations

Recommendations to Improve Future Impact Evaluations

- *For the Residential Energy Reports Program it would also be helpful to address persistence in savings from prior years.*
- *The PY2015 Home Lighting Rebate Program should update a number of key parameters based on the findings from the Ameren Missouri PY2014 evaluation.*

Recommendations to Improve Future Process Evaluations

Future process evaluations should include the following:

- *Consistent reporting of the key customer survey findings to facilitate comparisons along key metrics, including customer satisfaction with GMO and overall satisfaction with the program. The survey scales and questions should be consistent across all customer surveys, including both participant and non-participant surveys.*
- *The evaluators should provide new information regarding progress made towards addressing the specific Missouri process evaluation requirements, based on the findings from the process evaluations.*

Recommendations to Improve Future Cost-Effectiveness Analysis

Future cost-effectiveness analysis should incorporate the following elements:

- *Navigant should include copies of all work papers used to perform the benefit-cost analysis in a separate appendix, including assumptions used for avoided costs, administrative costs, and other critical inputs.*
- *The cost-benefit analysis should include clear descriptions of the terms used to arrive at the results, and the references throughout the report should be consistent and correct.*

Organization of This Report

This report is organized into the following sections to guide the reader through this summary of the key results:

- Section 1: Summary of Key Findings and Recommendations from the Impact Evaluations
- Section 2: Summary of Key Findings and Recommendations from the Process Evaluations
- Section 3: Summary of Cost-Effectiveness Findings
- Section 4: EM&V Auditor's Findings and Recommendations

Introduction

With the passage of the Missouri Energy Efficiency Investment Act in 2009, the State of Missouri and the stipulated agreement reached by GMO and its stakeholders signaled a new beginning of energy efficiency program offerings to all GMO customer classes. The 16 MEEIA programs were launched in 2013. In accordance with 4 CFR- 240-22.070(8), the electric utilities are required to complete process evaluations to improve program design and delivery processes and impact evaluations to assess progress towards meeting the annual energy and demand savings targets.

To meet these requirements, GMO contracted with Navigant Consulting, Inc. (Navigant) to conduct comprehensive evaluation, measurement and verification (EM&V) of its 16 DSM programs during the three-year period 2013-2015 (Navigant PY2013 EM&V Report, p. vii).

According to 4 CFR- 240-22.070(8), the electric utilities are required to complete process and impact evaluations.

> *…The purpose of these evaluations shall be to develop the information necessary to evaluate the cost-effectiveness and improve the design of existing and future demand-side programs and demand-side rates, to improve the forecasts of customer energy consumption and responsiveness to demand-side programs and demand-side rates and to gather data on the implementation costs and load impacts of demand-side programs and demand-side rates for use in future cost-effectiveness screening and integrated resource analysis.*
>
> *(A) Process Evaluation. Each demand-side program and demand-side rate that is part of the utility's preferred resource plan shall be subjected to an ongoing evaluation process which addresses at least the following questions about program design.*
>
> *1. What are the primary market imperfections that are common to the target market segment?*
>
> *2. Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?*
>
> *3. Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?*
>
> *4. Are the communication channels and delivery mechanisms appropriate for the target market segment?*
>
> *5. What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end-use measure included in the program?*
>
> *(B) Impact Evaluation. The utility shall develop methods of estimating the actual load impacts of each demand-side program and demand-side rate included in the utility's preferred resource plan to a reasonable degree of accuracy.*
>
> *1. Impact evaluation methods. At a minimum, comparisons of one (1) or both of the following types shall be used to measure program and rate impacts in a manner that is based on sound statistical principles:*
>
> *A. Comparisons of pre-adoption and post-adoption loads of program or demand-side rate participants, corrected for the effects of weather and other intertemporal differences; and*
>
> *B. Comparisons between program and demand-side rate participants' loads and those of an appropriate control group over the same time period.*
>
> *2. The utility shall develop load-impact measurement protocols that are designed to make the most cost-effective use of the following types of measurements, either individually or in combination:*
>
> *A. Monthly billing data, hourly load data, load research data, end-use load metered data, building and equipment simulation models, and survey responses; or*
>
> *B. Audit and survey data on appliance and equipment type, size and efficiency levels, household or business characteristics, or energy-related building characteristics.*

(C) The utility shall develop protocols to collect data regarding demand-side program and demand-side rate market potential, participation rates, utility costs, participant costs, and total costs.

In 2012, the Missouri Public Service Commission (PSC) contracted with Johnson Consulting Group, LLC, to serve as its EM&V Auditor to comply with 4 CSR 240-20.0943(7)[7] and to review and comment on compliance with 4 CSR 240-22.070(8) and on the overall quality, scope and accuracy of these reports.

This review consisted of the following components and processes. The EM&V Auditor Team members read each program's draft evaluation report in its entirety, and summarized the key findings and recommendations made by program by topic area. Organizing the findings at this level allows for a comprehensive review of the important trends among the programs and identifies issues that are important at both the program and portfolio level. The EM&V Auditor Team members also made additional recommendations based on the EM&V Auditor Team's collective experience with utility energy efficiency programs' EM&V best practices and professional judgment.

Lastly, the EM&V Auditor Team members assessed the overall quality of the program evaluations completed by Navigant.

This report is organized into the following sections, to help guide the reader through this summary of the key results:

- Section 1: Summary of Key Findings and Recommendations from the Impact Evaluations
- Section 2: Summary of Key Findings and Recommendations from the Process Evaluations
- Section 3: Summary of Cost-Effectiveness Analysis
- Section 3: EM&V Auditor's Findings and Recommendations

To facilitate the reader, the specific program evaluations are referenced in the text by the year of evaluation and specific page number (i.e., Navigant PY2014 EM&V Report, pp. 293-294) since all of the reports are for GMO for the PY2014. A list of all reports cited is located in the References Section of this report.

The percentages cited in parenthesis (%) are used to denote particular or significant findings from a particular evaluation finding and follow standard industry reporting conventions.

[7] 4 CSR 240-20.093(7) Evaluation, Measurement, and Verification (EM&V) of the Process and Impact of Demand-Side Programs. Each electric utility shall hire an independent contractor to perform and report EM&V of each commission-approved demand-side program in accordance with 4 CSR 240-20.094 Demand-Side Programs. The commission shall hire an independent contractor to audit and report on the work of each utility's independent EM&V contractor.

Section 1: Summary of Key Findings and Recommendations from the Impact Evaluations

This section summarizes the findings from these impact evaluations, while Section 3 provides the EM&V Auditor's assessment of the appropriateness of these savings estimates.

Navigant conducted impact evaluations to determine the savings estimates attributable to each program or measure. Navigant proposed and the utility approved a multiple year EM&V plan from PY2013 through PY2015.

As part of the EM&V Auditor's review, team members summarized the data from both the individual program and program portfolio evaluations.

1.1 Summary of Impact Evaluation Findings

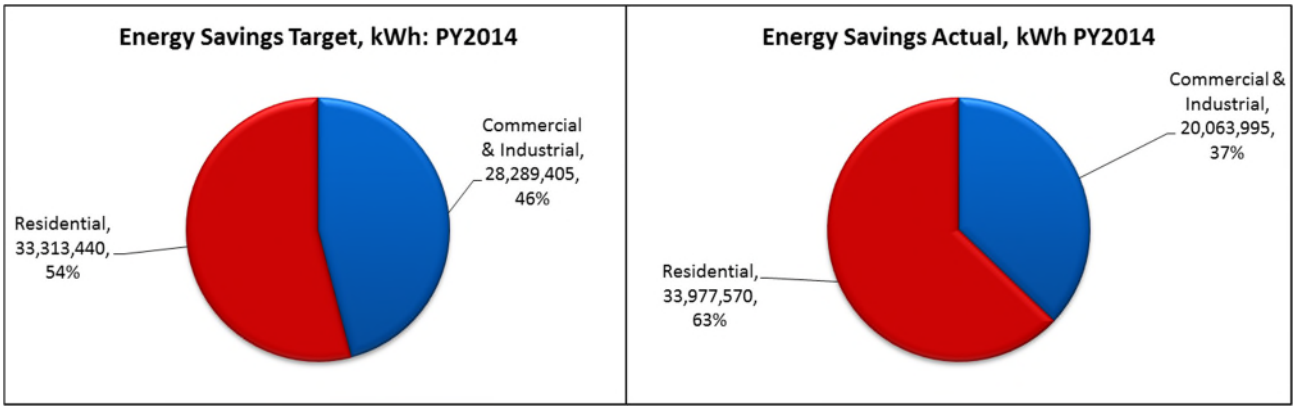
Portfolio Level Findings

This section summarizes the key energy savings estimates for both demand kilowatts (kW) and energy kilowatt-hours (kWh) across GMO's MEEIA program portfolio.

In PY2014, overall GMO's portfolio nearly met 93 percent of its gross energy savings goals . The total portfolio achieved 57,898,184 kWh and 23,564 kW in *ex post* energy and demand savings at the customer meter, resulting in gross realization rates of 93 percent and 107 percent, respectively**.**

Residential energy efficiency programs contributed to the largest percent of energy savings (66%). The biggest contributors were the Residential Energy Reports and Home Lighting Rebate programs, which together accounted for 53 percent of the total residential energy savings targets. The Air Conditioning Upgrade Rebate program exceeded its goals by more than double which offset shortfalls in the other programs.

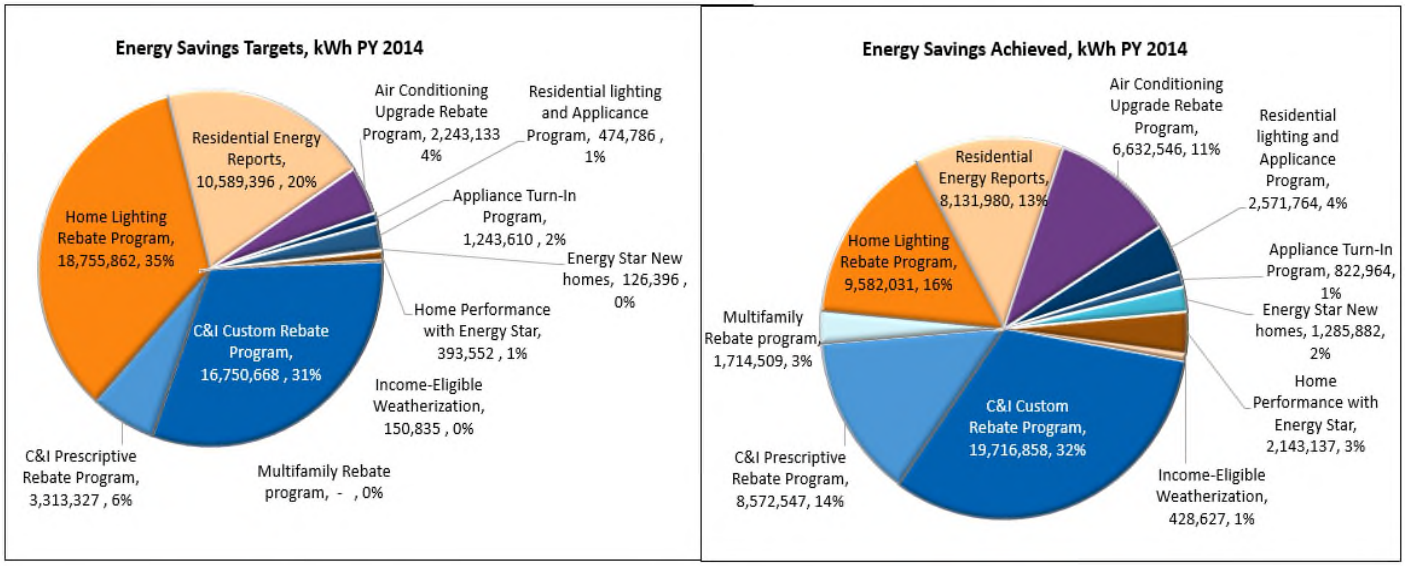
The two C&I EE programs account for 34 percent of portfolio energy savings, with the C&I Custom and Standard Rebate programs contributing 28.5 percent and 5.5 percent of portfolio energy savings, respectively. Figure 1 illustrates these findings (Navigant EM&V Report, PY2014, p. xxii).



(Sources: Navigant PY2014 EM&V Report, p. xxix and GMO MEEIA Filing)

Figure 1: Energy Savings Target and Achieved by Sector: kWh PY2014

The results for individual programs were mixed. The most successful residential programs were the Home Lighting Rebate (35% of portfolio), Residential Energy Reports (18%) while several programs contributed five percent or less to the overall energy efficiency program portfolio (i.e., Air Conditioning Upgrade Rebate; Appliance Turn In Residential Lighting & Appliance Program and Home Performance with ENERGY STAR®. Figure 2 shows the targets and achieved savings for each of the portfolio programs.



(Sources: Navigant PY2014 EM&V Report, p. xvii and GMO MEEIA Filing)

Figure 2: Energy Saving Targets: Percent of Total

Table 1 summarizes the GMO energy efficiency targets, gross savings *ex ante* values, gross savings *ex post* values, net savings *ex post* values, and percent of target achieved (net achievement compared to the targets for energy savings). To ensure clarity, these terms are defined as follows:

- **Energy Savings Targets** – Target values are annualized savings targets for the residential, commercial, and industrial sectors.
- **Gross Savings *Ex Ante*** – *Ex ante* gross savings are annualized savings either reported by GMO MEEIA programs, or as calculated by applying tracked program activity to TRM savings values.
- **Gross Savings *Ex Post*** – *Ex post* gross savings are annualized savings as calculated and presented by the evaluator, which is generally known as "Realized kWh Savings" or "Achieved Savings" in the report.
- **Net Savings *Ex Post*** – *Ex post* net savings is the *ex post* savings multiplied by the net-to-gross (NTG) ratio, which accounts for free ridership, spillover effect, and market effects.

As Table 1 shows, the total gross savings reported *ex ante* is 61,998,822 kWh. The evaluators calculated a total gross savings of 57,898,184 kWh, which suggests a gross realization rate of 93.4 percent. After adjusting for preliminary net-to-gross, ratios, which were updated in PY2014 for five programs: C&I Custom Rebate Program, C&I Standard Rebate Program, ACUR Program, RLA Program, and the ATI Program, the evaluated savings were 54,041,564 kWh.

Table 1: GMO Portfolio Energy Savings in PY2014, kWh

Program	Energy Savings Targets 2014	Gross Savings *Ex Ante*	Gross Savings *Ex Post*	Net Savings *Ex Post*: 2014	% of Target Achieved
C&I Custom	19,716,858	14,506,591	16,584,820	16,750,668	85%
C&I Standard Rebate	8,572,547	3,670,965	3,216,822	3,313,326	39%
Multifamily	1,714,509	0	0	0	0
Residential Energy Report	8,131,980	9,931,518	10,589,396	10,589,396	130%
Air Conditioning Upgrade Rebate Program	6,632,546	2,665,081	3,159,342	2,243,133	34%
Residential Light &Appliance	2,571,764	3,703,199	832,958	474,786	18%
Home Performance with ENERGY STAR®	2,143,137	468,535	468,514	393,552	18%
ENERGY STAR® New Homes	1,285,882	126,391	126,396	126,396	10%
Appliance Turn-In	822,964	2,855,436	2,220,733	1,243,610	151%
Income-Eligible Weatherization	428,627	134,434	150,835	150,835	35%
Home Lighting Rebate	9,582,031	23,936,672	20,548,368	18,755,862	196%
MPower	0	0	0	0	N/A
Energy Optimizer	0	0	0	0	N/A
Total	**61,602,845**	**61,998,822**	**57,898,184**	**54,041,564**	**88%**

(Source: Navigant 2014 Program EM&V Report, p. xviii)

Table 2 shows the gross savings *ex ante*, gross savings *ex post* and net savings *ex post* for demand reductions for PY2014. Four residential programs significantly exceeded their kW savings goals with

Income-Eligible Weatherization Program exceeding its target by 343 percent followed by the Appliance Turn In (258%), Residential Energy Reports (243%) and the Home Lighting Rebate Program (210%).

The poorest performers relative to kW goals were the Multifamily (0%) and the Residential Lighting and Appliance Program (5%) as Table 2 shows.

Table 2: GMO Demand Reductions in PY2014, kW

Program	Demand Savings Targets 2014	Gross Savings E*x Ante*	Gross Savings *Ex Post*	Net Savings *Ex Post*: 2013	% of Target Achieved
C&I Custom	2,678	2,367	2,569	2,595	97%
C&I Prescriptive	1,765	861	879	905	51%
Multifamily	115	0	0	0	0%
Residential Energy Report	1,251	2,749	3,046	3,046	243%
Air Conditioning Upgrade Rebate Program	3,882	1,464	3,327	2,362	61%
Residential Lighting & Appliance	1,308	596	105	60	5%
Home Performance with ENERGY STAR®	988	218	218	183	19%
ENERGY STAR® New Homes	392	93	86	86	22%
Appliance Turn-In	60	378	276	155	258%
Income-Eligible Weatherization	30	100	103	103	343%
Home Lighting Rebate Program	1,018	2,545	2,339	2,135	210%
MPower	18,132	5,842	5,760	5,760	32%
Energy Optimizer	2,822	4,746	4,856	4,856	172%
Total	**34,441**	**21,959**	**23,564**	**22,246**	**65%**

(Source: Navigant 2014 Program EM&V Report, pp. xxx)

The PY2014 Net-to-Gross (NTG) evaluation activities are preliminary directional estimates of net-to-gross components (free ridership, spillover and market effects) and included the following programs:

- Commercial and Industrial Programs:
  - C&I Prescriptive Rebate Program
  - C&I Custom Rebate Program
- Residential Programs:
  - Air Conditioning Upgrade Rebate Program
  - Residential Lighting and Appliance Rebate Program
  - Appliance Turn-In Program
  - Home Performance with ENERGY STAR® Program

Navigant is planning on developing the net-to-gross ratios for most programs over the course of the three-year evaluation cycle and will not finalize the estimates until after the third program year. This approach is used to permit capturing a range of different data using multiple methods to capture not only free ridership, but also spillover and market effects information over the course of the three-year program cycle.

The basis for the NTG surveys was a mix of the customer self-report approach, based off the "fast feedback" approach and end of year surveys, as well as trade ally surveys. The Appliance Turn-in Program leveraged the methodology based on the Uniform Methods Project (UMP) Appliance Recycling protocol[8] to estimate free ridership. Findings from the preliminary NTG research, including free ridership and spillover rates from both the participant and trade ally surveys are summarized in Table 3.

Table 3: Estimated Free Ridership, Spillover, and Market Effect Rates for Each Program

Program	Estimated Free Ridership Rates	Estimated Participant Spillover Rates	Non-participant Spillover	NTGR
C&I Custom	0.15	0.04	0.11	1.01
C&I Standard	0.11	0.03		1.03
Multifamily [9]	NA	NA	NA	1.00
Residential Energy Report[10]	NA	NA	NA	1.00
Air Conditioning Upgrade Rebate	0.35	0.00	0.10	0.75
Residential Lighting & Appliance	0.49	0.06	NA	0.57
Home Performance with ENERGY STAR®	0.21	0.05	NA	0.84
ENERGY STAR® New Homes[11]	NA	NA	NA	1.00
Appliance Turn-In	0.44	NA	NA	0.56
Income – Eligible Weatherization[12]	NA	NA	NA	1.00
Home Lighting Rebate Program	NA	NA	NA	.90
MPower[13]	NA	NA	NA	1.00
Energy Optimizer[14]	NA	NA	NA	1.00

(Source: Navigant 2014 Program EM&V Report, pp. xxviii)

[8] The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures, Chapter 7: Refrigerator Recycling Evaluation Protocols, National Renewable Energy Laboratory, March 2013, http://www1.eere.energy.gov/wip/pdfs/53827-7.pdf.

[9] The Multi-Family Program was determined to be so small that the cost of assessing net savings was judged to exceed the value of the contribution to total energy savings.

[10] Savings for the RER program are determined from a billing analysis, which inherently estimates net savings, so no further NTG adjustment is applied to the savings.

[11] The ENERGY STAR New Homes Programs participation was determined to be so small that the cost of assessing net savings was judged to exceed the value of the contribution to total energy savings

[12] The NTG ratio for the Income Weatherization Program, as a low-income program, was assumed to be 1.0.

[13] Navigant does not plan to conduct net-to-gross research for MPower since it is a demand response program. A NTG of 1.0 is assumed.

[14] Navigant does not plan to conduct net-to-gross research for the Energy Optimizer Program since it is a demand response program and a NTG of 1.0 is assumed.

Almost all of the preliminary NTG estimates are in line with Illinois SAG NTG values and when benchmarked against other recent studies are also well within an expected range. The preliminary estimates of the NTG components for the C&I programs do appear to be higher than the estimates from the Illinois SAG and the EM&V auditors expectations. This may be partly driven by the high non-participant spillover estimates, which are discussed below.

Program Level Findings

The following section summarizes the overall program performance by program.

C&I Custom Rebate Program

Although the C&I Custom Rebate Program has been in operation since 2008, the program implementer was replaced in 2014. The program provides rebates for installing qualifying high-energy efficiency equipment or systems in new or retrofit situations. Equipment may include, but is not limited to HVAC, motor, lighting, pumping, and/or other qualifying equipment. The *ex ante* savings for this program are from custom calculations by the program implementer.

The C&I Custom Program is not meeting its target savings goals. C&I Custom Rebate Program realized 114 percent of its *ex ante* savings, and the high realization rate is attributed to adjustments made by the evaluator for waste heat factors and coincidence factors. However, similar to PY2013, the program achieved 84 percent (16,584,820 kWh) of its proposed savings target presented in the GMO MEEIA Stipulation and Agreement (19,716,858 kWh). Table 4 summarizes the C&I Custom Rebate Program's PY2014 results.

Table 4: Summary of C&I Custom Rebate Program Impact Findings

	Energy (kWh)	Demand (kW)
Target	19,716,858	2,678
Ex Ante Gross	14,506,591	2,367
Ex Post Gross	16,584,820	2,569

(Sources: Navigant PY2014 EM&V Report, p. 27)

The C&I Custom program was heavily weighted towards lighting, which made up 89 percent of the savings. Other measures such as motors, variable speed drives, custom industrial measures and HVAC make up the 11 percent of saving not attributed to lighting.

C&I Standard Program

The C&I Standard Program encourages GMO's C&I customers to install standard energy- efficient measures in existing facilities. The program provides incentives to facility owners for the installation of high-efficiency equipment and controls. In addition, the program provides a marketing mechanism for electrical contractors, mechanical contractors, and their distributors to promote energy-efficient equipment to end users (Navigant PY2014 EM&V Report, p. 25). Table 5 summarizes the impact results from this program.

Table 5: Summary of C&I Prescriptive Rebate Program Impact Findings

	Energy (kWh)	Demand (kW)
Target	8,572,547	1,765
Ex Ante Gross	3,670,965	861
Ex Post Gross	3,216,822	879

(Sources: Navigant PY2014 EM&V Report)

Most of the savings from the C&I Standard Program are from lighting and lighting controls (89%). Linear fluorescent T8 and T5 fixtures account for approximately 80 percent of the program's energy and coincident demand savings. Preliminary *ex ante* performance for the Custom Program is reported at 85 percent of target for energy and 105 percent of its demand goals (Navigant PY2014 EM&V Report, p. 30).

The C&I Prescriptive Program significantly missed its energy savings goals. Last year they achieved the targets, but the target savings doubled to 8,572,547 kWh. This increase meant that the program had a gross energy savings realization rate of 87.6 percent; however, the gross demand reduction realization rate was 102 percent. After adjusting for free ridership, this program achieved net energy savings of 3,313,327kWh, just 39 percent of the energy savings target for PY2014 (Navigant PY2014 EM&V Report, p. 31).

Most of the savings (77%) in the Standard program came from lighting and lighting controls, 21 percent from VFDs, and the remaining from HVAC measures (Navigant PY2014 EM&V Report, p. 31).

Commercial Programs Measurement & Verification

Navigant used a sampling approach in their M&V efforts for both the C&I Custom and Standard programs. The sampling methods appear to be well thought out and defensible. Navigant reports that that for the C&I Custom program, sampling resulted in 90 percent confidence of being within 8.7 percent of actual energy savings and 19.9 percent for demand in a one tailed test (Navigant PY2014 EM&V Report pp. 32, 35). For the C&I Standard Program, the evaluator adjusted the sampling strata based on final year end data and report a relative precision of 19 percent at a 90 percent confidence level (Navigant PY2014 EM&V Report p. 34). This high relative precision is due to significant differences in realization rates from project to project and may point to a need to use more robust *ex ante* estimates.

Navigant conducted onsite evaluation for a sample of projects and that "*Data collected can be used to inform the statewide TRM effort*" (Navigant PY2014 EM&V Report p. 36).

Discrepancies between the savings values are attributed to a mix of factors including incorrect hours of operation, improper coincidence factors, and differences between assumed and actual wattages, (Navigant PY2014 EM&V Report, pp. 40-41, 45-46).

Commercial Program NTG analysis

Net to gross (NTG) ratios were calculated based on participant fast-feedback surveys, end of year telephone surveys and trade ally surveys. The NTG analysis is being conducted over the three year evaluation period per the Navigant EM&V plan and the efforts undertaken this year are in keeping with the overall plan.

In 2013 the NTG ratios for the commercial programs were stipulated at 1.0, and the calculated NTG ratios did not change much from the stipulation, coming in at 1.01 for the Custom Program and 1.03 for the Standard Program (Navigant PY2014 EM&V Report, p. 48).

Navigant stated that "*Preliminary net impacts are not final and are intended for information purposes only"* (Navigant PY2014 EM&V Report, p. 60). The final net savings values will be adjusted at the end of the three-year program cycle.

Residential Programs Impact Evaluation

This section summarizes the findings from the impact evaluation of GMO's residential energy efficiency programs.

Multifamily Rebate Program

The Multifamily Rebate Program offers prescribed rebates for energy-efficient products to encourage multi-family property owners or managers in the GMO territory to install energy-efficient products in common areas and dwelling units of multi-family complexes, mobile homes, and condominiums. Eligible buildings include multifamily complexes, mobile homes, and condominiums with two or more dwellings that receive electric service from GMO.

There was one pre-approved applicant in this program in PY2014. However, the project was not completed during the program year, so no energy or coincident demand savings were claimed. Subsequently, Navigant did not perform an impact evaluation of this program (Navigant PY2014 EM&V Report, pp. 88-90). The findings are summarized in Table 6.

Table 6: Summary of Multifamily Impact Findings

	Energy (kWh)	Demand (kW)
Target	1,714,509	115
Ex Ante Gross	0	0
Ex Post Gross	0	0

(Sources: Navigant PY2014 EM&V Report, p. 90)

Residential Energy Reports Program

Launched in August 2013, GMO's Residential Energy Reports (RER) Program is designed to generate energy savings by providing residential customers with information about their specific energy use and energy conservation suggestions and tips. Program participants receive information in the form of home energy reports that give customers various types of information.

This program implemented as a Randomized Control Trial (RCT), in which qualifying customers are randomly assigned to either the treatment group, which receives home energy reports, or to the control group, which does not receive reports, for the purpose of estimating changes in energy use due to the program. Navigant leveraged the RCT to calculate *ex post* program impacts using two alternative approaches—a simple post-program regression (PPR) analysis with lagged controls, and a linear fixed-effects regression (LFER)—applied to monthly energy usage data obtained from customer bill records. Savings were also adjusted to account for "uplift" in other GMO energy efficiency programs.

The Residential Energy Reports program exceeded its program targets. As Table 7 shows, *ex post* savings were slightly greater than *ex ante* savings, with an energy realization rate of 107 percent and a demand realization rate of 111 percent.

Table 7: Summary of Residential Energy Reports Impact Findings

	Energy (kWh)	Demand (kW)
Target	8,131,980	1,251
Ex Ante Gross	9,931,518	2,749
Ex Post Gross	10,589,396	3,046

(Sources: Navigant PY2014 EM&V Report, p. 107)

Air Conditioning Upgrade Rebate Program

The Air Conditioning Upgrade Rebate (ACUR) Program is a residential heating, ventilation, and air conditioning (HVAC) testing, tune-up, and replacement program

For program evaluation, Navigant calculated project-specific savings based on unit size, contractor-measured operational energy efficiency ratio (EER) data, nameplate seasonal energy efficiency ratio (SEER), and GMO-specific full load hours and coincidence factors for early retirement of HVAC measures.

In PY2014, Air Conditioning Upgrade Rebate (ACUR) Program achieved 3,159,342 kWh and 3,327 kW in energy and demand savings, respectively, at the customer meter, resulting in realization rates of 119 percent and 227 percent (Navigant PY2014 EM&V Report, p. 129). Table 8 summarizes the key impact findings from this program.

Table 8: Summary of Air Conditioning Upgrade Rebate Program Impact Findings

	Energy (kWh)	Demand (kW)
Target	6,632,546	4,036
Ex Ante Gross	2,665,081	1,464
Ex Post Gross	3,159,342	3,327

(Sources: Navigant PY2014 EM&V Report, pp. 132-133)

Residential Lighting and Appliance Rebate Program

The Residential Lighting and Appliance (RLA) program is an upstream rebate program that encourages the purchase of energy-efficient consumer products including ENERGY STAR® appliances. Refrigerators and programmable thermostats were removed from the program in the fall of 2014. Participants complete the application and mail it with a copy of the sales receipt or invoice for the purchase to the program implementer, Energy Federation Incorporated (EFI). The applications include a list of all available rebates; participants must submit one application per appliance. Participants can indicate if they want to receive a free two-bulb pack of CFLs on their rebate application (Navigant PY2014 EM&V Report, p. 173).

In PY2014, Navigant verified that the RLA Program achieved 823,958 kWh and 105 kW in energy and demand savings at the customer meter, resulting in realization rates of 22 percent and 18 percent, respectively. These low rates are largely due to the incorrect assignment of refrigerator recycling being applied to new ENERGY STAR® refrigerator measure savings (Navigant PY2014 EM&V Report, p. 176).

Table 9: Summary of Residential Lighting and Appliances Impact Findings

	Energy (kWh)	Demand (kW)
Target	2,571,764	1,308
Ex Ante Gross	3,703,199	596
Ex Post Gross	832,958	105

(Sources: Navigant PY2014 EM&V Report, pp. 183-184)

For lighting (CFL) measures, Navigant included waste heat factors and an installation rate in savings calculations for compact fluorescent lamps (CFLs), applied a baseline bulb wattage to account for increased efficiency standards due to the Energy Independence and Security Act of 2007 (EISA), and adjusted hours of use based on the survey results for room installations ((Navigant PY2014 EM&V Report, p. 193).

Home Performance with ENERGY STAR® (HPwES)

This home retrofit program is co-sponsored by GMO and Missouri Gas Energy (MGE). Customers schedule an appointment with a certified Home Energy Rating System (HERS) rater who conducts performance testing of heating, ventilation, and air conditioning (HVAC) systems and building tightness reviews the customer's appliances and building shell, and produces an audit report, the Home Energy Assessment. The Home Energy Assessment recommends improvements in home operation as well as building improvements (e.g., insulation).

The rebate level varies by the types of improvements completed. To apply for the program, a customer contacts Metropolitan Energy Center (MEC), the program implementer, through its call center or online and is referred to an approved HERS rater. The participant has 12 months from the audit to install at least one recommended improvement, receive a post-installation inspection of work, and submit the rebate application to MEC.

The HPwES program achieved 468,514 kWh and 218 kW in energy and demand savings at the customer meter, resulting in realization rates of 100 percent for both energy and coincident demand (Navigant PY2014 EM&V Report, p. 214). Table 10 summarizes these results.

Table 10: Summary of Home Performance with ENERGY STAR® Impact Findings

	Energy (kWh)	Demand (kW)
Target	2,143,137	988
Ex Ante Gross	468,535	218
Ex Post Gross	468,514	218

(Sources: Navigant PY2013 EM&V Report, p. 214)

ENERGY STAR® New Homes Program

The ENERGY STAR® New Homes (ESNH) program is designed to improve the energy efficiency of homes built in the residential construction market by applying efficient construction techniques and high-performance products according to the EPA guidelines through the ENERGY STAR® program. To earn the ENERGY STAR® label, a home must be rated or certified to ENERGY STAR® version 3.0 requirements and pass inspections and achieve a Home Energy Rating System (HERS) rating of 85 or less, meaning they are built at least 15 percent more energy efficient than homes built to the 2004 International Residential Code (IRC) (Navigant PY2014 EM&V Report, p. 226).

Although 52 homes met the ESNH program standards in PY2014, the program experienced high free ridership rates. Based on the preliminary NTG results, the program has only achieved five percent of its net energy savings and 11 percent of its net coincident demand savings target to date (Navigant PY2014 EM&V Report, p. 227).

Table 11 summarizes the impact evaluation findings for this program. But given the high free ridership rates and low cost-effectiveness results, it is likely that this program will be discontinued in PY2015.

Table 11: Summary of ENERGY STAR® New Homes Impact Findings

	Energy (kWh)	Demand (kW)
Target	1,285,882	392
Ex Ante Gross	126,391	93
Ex Post Gross	126,396	86

(Source: Navigant PY2014 EM&V Report, p. 228)

Appliance Turn-In Program

The Appliance Turn-In (ATI) program is an appliance recycling program for working secondary refrigerators, freezers, window air conditioners, and dehumidifiers. The program is implemented by JACO Environmental (JACO) and its local subcontractor, Conservation Services Group (CSG).

There is a limit of three appliances per residence. The customer makes the initial call to the CSG service line to apply for the program and schedule an appointment for a home pick-up. Part of the telephone application entails completing an inventory of the appliances eligible for recycling. Customers receive a rebate of $75.00 for recycled refrigerators and freezers, and $25.00 for room air conditioners and dehumidifiers (Navigant PY2014 EM&V Report, p. 238).

For the ATI Program, Navigant adjusted savings based on separately deriving saving for refrigerator/freezers and room air conditioners/dehumidifiers (Navigant PY2014 EM&V Report, p. 242). Refrigerators and freezers were evaluated using equations from the Uniform Methods Project (UMP) and IL TRM (Navigant PY2014 EM&V Report, p. 233). Room air conditioner and dehumidifier recycling savings were based on Michigan Deemed Savings (Navigant PY2014 EM&V Report, p. 242.)

The ATI Program had mixed results. The impact evaluation found that the program had an energy realization rate of 78 percent and a demand realization rate of 73 percent for PY2014 (see Table 12).

Table 12: Summary of Appliance Turn-In Impact Findings

	Energy (kWh)	Demand (kW)
Target	822,964	60
Ex Ante Gross	2,855,436	378
Ex Post Gross	2,220,733	276

(Sources: Navigant PY2014 EM&V Report, p. 240)

Income-Eligible Weatherization Program

The Income-Eligible Weatherization program assists low-income customers in reducing energy use and bills by weatherizing their homes. GMO partners with non-profit low-income advocacy groups called Community Action Programs (CAPs) to implement the program. Weatherization crews hired by CAPs perform site visits at the request of low-income customers to complete home energy audits, identifying drafts and other sources of inefficiency, and evaluating needed heating and cooling system repairs. In response to audit findings, pending approval by the program manager, the program may finance air sealing, ceiling insulation, wall insulation, window replacement and heating or cooling system repairs in order to effectively weatherize the home (Navigant PY2014 EM&V Report, p. 267).

After correcting database tracking errors, Navigant concluded that the program exceeded both its energy and demand targets. In PY2014, the program had an energy realization rate of 112 percent and demand realization rate of 103 percent as summarized in Table 13.

Table 13: Summary of Income-Eligible Weatherization Impact Findings

	Energy (kWh)	Demand (kW)
Target	428,627	30
Ex Ante Gross	134,434	100
Ex Post Gross	150,835	103

(Sources: Navigant PY2014 EM&V Report, p. 269)

Home Lighting Rebate Program

The Home Lighting Rebate (HLR) program, launched in July 2014, is an instant rebate upstream lighting program that reduces the cost for GMO customers to purchase efficient light bulbs. Customers can visit participating retail outlet stores to purchase wide variety of bulb types, from standard spiral CFLs and socket LEDs to specialty 3-Way, globe, and flame bulbs (Navigant PY2014 EM&V Report, p. 286).

However, Navigant raised concerns about the *ex ante* savings assumptions used for these program measures. The *ex ante* savings are based on the Ameren Missouri TRM[15] but Navigant was unable to verify exactly how these assumptions were applied to determine *ex ante* savings. In addition, Navigant's review found that the Ameren Missouri TRM does not account for an in-service rate or HVAC interactive effects. Additionally, the baseline wattages recommended in the Ameren Missouri TRM are not consistent with the Energy Security and Independence Act (EISA) published standards that went into effect January 1, 2014.[16] Therefore, these factors are likely driving differences in *ex ante* and *ex post* savings (Navigant PY2014 EM&V Report, p. 289).

[15] Appendix A – Technical Resource Manual, Ameren Missouri 2012. Residential Lighting.

[16] 10CFR430.32, Subpart C. General Service Incandescent Lamp Standards, commonly referred to as "EISA Standards".

Table 14 summarizes the findings from the Home Lighting Rebate Program. Differences in *ex ante* and *ex post* savings are due to differences in operational parameters, such as hours of use (HOU), in-service rates, heating, ventilation, and air conditioning (HVAC) interaction factors, and baseline lamp wattage assumptions.

Table 14: Summary of Residential Home Lighting Rebate Impact Findings

	Energy (kWh)	Demand (kW)
Target	9,582,031	1,018
Ex Ante Gross	23,936,672	2,545
Ex Post Gross	20,548,368	2,339

(Source: Navigant PY2014 EM&V Report, pp. 288)

1.2 Demand Response Programs Impact Evaluation

MPower Program

MPower is a seasonal, event-based DR program that provides customers monetary incentives to reduce demand during peak load periods. The program is open to current GMO C&I electric customers with a load curtailment capability of at least 25 kW during the curtailment season (June 1–September 30) and during designated curtailment hours (12 PM–10 PM).

GMO may call up to ten curtailment events during any curtailment season. Events may last from a minimum of two hours up to eight hours. Participants may choose the maximum number of events for which they are willing to commit (Navigant P2014 EM&V Report, p. 315).

However, no MPower curtailment events were called in 2014, which not only limited the scope of the impact evaluation but could also jeopardize the overall effectiveness of the program.

No net-to-gross (NTG) analysis was performed, since MPower participants are contractually obligated to reduce load to their FPL levels. Navigant assumed a NTG ratio of 1.0 (Navigant PY2014 EM&V Report, pp. 307-308). Table 15 summarizes the results for MPower program in PY2014.

Table 15: Summary of MPower Program Impact Findings

	Demand (kW)
Target	3,505
Ex Ante Gross	5,842
Ex Post Gross	5,760

(Source: Navigant PY2014 EM&V Report, p. 318)

Although MPower program "holds great potential for DR savings" (p. 305) however, there were only six verified participants in PY2014 (2014 Navigant GMO EM&V Report p. 314).

Energy Optimizer Program

GMO's Energy Optimizer program is a residential and small commercial direct load control (DLC) program implemented by Honeywell, which allows the utility to call curtailment events during peak demand periods. Programmable, communicating thermostats are installed to control HVAC systems in participants' homes or businesses, free of charge. When the utility calls a curtailment event, Honeywell controls the thermostats remotely to run HVAC systems in one of several energy optimizing patterns for up to four hours.

GMO can extend the curtailment when necessary by strategically and sequentially initiating curtailment in different regions of its service territory. Participants are allowed to override the system once per month to prevent curtailment. Customer motivation for participating is based on receiving a free programmable thermostat that is accessible through the internet and receiving free maintenance. The program does not offer any additional incentive for participation. If a customer leaves the program before their contract term ends, the thermostat is uninstalled by Honeywell (Navigant PY2014 EM&V Report, pp.337-338).

Energy Optimizer is currently performing well in terms of participation and DR savings capacity. Honeywell succeeds in enrolling several thousand new participants to the program each year, more than the number that exits the program. The program exceeded its enrolled capacity targets in 2014 by 68 percent (Navigant PY2014 EM&V Report, p. 339).

However, no DR events were called in 2014 which limited Navigant's scope in its impact evaluation. In addition, no NTG analysis was performed, since DLC compressor cycling is not available to GMO residential customers outside of the Energy Optimizer program and thus a NTG ratio of 1.0 is assumed (Navigant PY2014 EM&V Report, p. 340) (see Table 16).

Table 16: Summary of Energy Optimizer Program Impact Findings

	Demand (kW)
Target	2,822
Ex Ante Gross	4,746
Ex Post Gross	4,856

(Source: Navigant PY2014 EM&V Report, p. 340)

1.3 Summary of Impact Evaluation Recommendations

The evaluators provided a total of 22 impact recommendations based on their findings from the impact evaluations. Of these 22, eight were repeated from P2013, suggesting that these recommended improvements have not yet been made. Four of these recommendations were for improvements to database tracking, while four were related to energy calculations. Both of these areas accounted for the majority of all recommendations (91%) while the evaluators only made two recommendations to improve QA/QC.

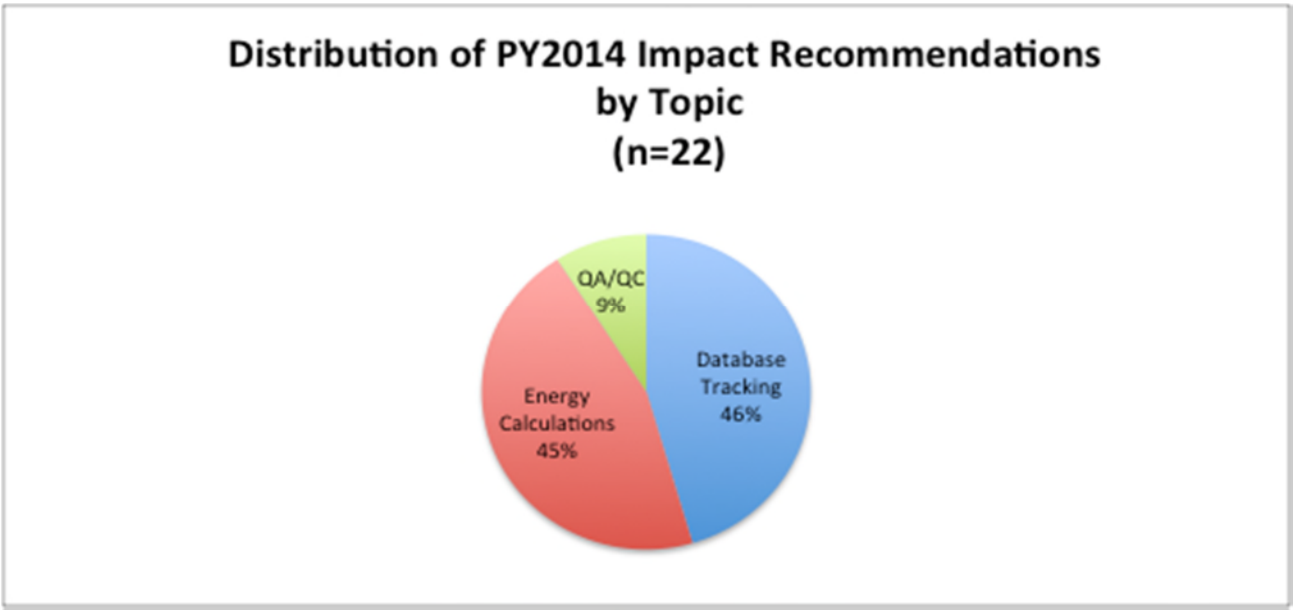


Figure 3: Distribution of PY2014 Impact Recommendations by Topic

Database Tracking Recommendations

The evaluators provided a total of 10 recommendations to improve database tracking, of which four were repeated from the PY2013 evaluation of the C&I Custom and Standard Program. All of these recommendations offered additional guidance on ways that GMO could enhance its database reporting and tracking:

- *Include facility/building type in the data extracts from VisionDSM* (Navigant PY2014 EM&V Report, pp. xxi, 62);
- *Include deemed fixture wattage values in the project file calculations* (Navigant PY2014 EM&V Report, pp. xxiii, 63);
- *Track key project milestones including changes to project scope* (Navigant PY2014 EM&V Report, pp. xxiii, 63);
- *Include critical measure information such as size, efficiency, manufacturer, and model specifications of the system, bulb wattage and style to support ex post savings calculations* (Navigant PY2014 EM&V Report, pp. xxiii, 63); and

- *Use project-specific data for calculating savings from the Early Retirement measure based on unit size and SEER before and after the retrofit* (Navigant PY2014 EM&V Report, p. xxi).
- *Correct the current database system values to reflect the appropriate deemed savings estimates* (Navigant PY2014 EM&V Report, p. xxiv)

Energy Calculation Recommendations

The evaluators also provided 10 recommendations that would improve the accuracy of the energy calculations used to derive energy savings estimates. Of note, four of these recommendations were repeated from the PY2013 impact evaluation and all were for the C&I Custom and Standard Program. These recommendations were aimed at improving overall accuracy in the following ways:

- *Include waste heat factors in the energy and coincident demand savings algorithms* (Navigant PY2014 EM&V Report, p. xxiii, 62);
- *Calculate and track ex ante savings based on building type-specific hours of operation , coincidence factors, and waste heat factors* (Navigant PY2014 EM&V Report, p. 62);
- *Revise ex ante algorithms to account for project-specific lighting load using the watts controlled database field* (Navigant PY2014 EM&V Report, p. 62); and
- *Update the values used in key measures in the Appliance Turn-In Program for room air conditioners, dehumidifiers and recycled refrigerators based on information from other TRMs* (Navigant PY2014 EM&V Report, p. 253).

QA/QC

The evaluators also provided two recommendations on ways to enhance the QA/QC operations for the following two programs:

- *For the Air Conditioning Upgrade Program, GMO should investigate quality control practices for Charge & Flow Repair measure performance data, specifically operational EER both before and after the tune-up* (Navigant PY2014 EM&V Report, pp. xxiv, 163); and
- *For the Income-Eligible Weatherization Program, GMO should implement a quality control strategy to ensure that fewer data tracking errors are made in future program years* (Navigant PY2014 EM&V Report, p. 273).

Section 2: Summary of Key Findings and Recommendations from the Process Evaluations

Overview of Process Evaluation

The primary objective of a process evaluation is to "help program designers and managers structure their programs to achieve cost-effective savings while maintaining high levels of customer satisfaction."[17] A process evaluation gathers information from a variety of sources, including program staff, market actors, trade allies, program participants, and non-participants. To increase the validity of the findings, it is necessary to gather data from multiple sources and then "triangulate" the data or compare it across multiple groups. This methodology increases the overall validity of the findings.

2.1 Summary of Process Evaluation Findings

This section summarizes the key findings from the process evaluations of GMO's energy efficiency program portfolio targeting both residential and business customers. It is based on a thorough review of the EM&V report prepared for each program. References are provided throughout to aid the reader. The findings are organized by key topic area to facilitate the analysis across the entire portfolio.

Customer Satisfaction

Customer satisfaction remains high across GMO's programs. Although customer satisfaction was not reported for all programs in PY2014, satisfaction remained high among program participants in the C&I Custom and Standard, RER (62%) and ATI programs (Navigant PY2014 EM&V Report, pp. xlv-xlvi, 117). Almost all (87%) ATI participants expressed that they had received high levels of customer service from the program implementation staff (Navigant PY2014 EM&V Report, p. 249).

Satisfaction with GMO-KCP&L remained high among those respondents who were queried. More than one-half (58%) of C&I Standard & Custom Program participants and 75 percent of the ACUR participants were "Extremely Satisfied" with KCP&L (Navigant PY2014 EM&V Report, pp. 73, 84, 117, 119, 121).

Trade Ally Satisfaction

Satisfaction among trade allies for the C&I programs remained high. Overall trade ally satisfaction is still high (84%) (Navigant PY2014 EM&V Report, pp. xlvi, 73). Satisfaction was not reported for other GMO programs in the process evaluations in PY14.

Sources of Awareness

Customers learn about these programs from a variety of sources. Participating contractors alerted customers to the rebates available through the ACUR as they were looking to replace or repair air conditioning equipment (Navigant PY2014 EM&V Report, pp. 167, 170-172).

Additionally, participants did not seek out trade allies through the program website, but instead used contractors they were already familiar with or who were recommended to them by another source.

[17] http://www.calmac.org/events/EvaluatorsProtocols_Final_AdoptedviaRuling_06-19-2006.pdf.

Bill inserts are also another most way of reaching customers to tell them about the RLA, ATI and ACUR programs (Navigant PY2014 EM&V Report, pp. 172, 238).

For the RLA Program, most customers learned about the program through in-store advertising (Navigant PY2014 EM&V Report, pp. l, 205-206).

Cross Promotion

The results of cross promotion of HLR and ATI programs are mixed. The Customer Engagement Tracker survey shows low levels of awareness and mixed motivation impacts, but the uplift analysis demonstrates increased participation in ATI (Navigant PY2014, p. xlix).

The process evaluations found that most RER, RLA and the ATI program participants are not aware of other GMO EE programs (Navigant PY2014 EM&V Report, pp. l, 121, 129). For example, 58 percent could not describe or name another GMO energy efficiency program (Navigant PY2014 EM&V Report, pp. 129, 261).[18] Awareness of ATI (6%) and HLR (3%) are particularly indicative for how RER is serving as a venue because OPower is specifically promoting them. (Navigant PY2014 EM&V Report, p. 261)

In 2014, the ACUR Program increased the amount of cross-promotional literature included with the free CFLs that the customer can receive after participating in the program, which led to a slight improvement as 35 percent of participants who received CFLs from the program were aware of any other GMO programs.

However, this program has not been able to use contractors to distribute literature about the other programs, so the cross-promotional efforts will be focused on direct mailing and emails (Navigant PY2014 EM&V Report, pp. 177-178).

In addition, the HPwES program does not specifically promote the ACUR Program to its participants (Navigant PY2014 EM&V Report, p. xliv)

Most participants who participate in both the RLA Rebate program and the ATI programs either participated in both concurrently or participated in the RLA program first. Thirty-seven percent of the ATI Program participants surveyed also participated in the RLA program (Navigant PY2014 EM&V Report, pp. lii, 263).

This was because the program implementer has an agreement with a major appliance big box retailer to integrate the program recycling application into the in-store sales transaction. When participants purchase their new appliance, they will also be able to apply to have their old appliance picked up at home by the program (Navigant PY2014 EM&V Report, p. 256).

The program manager stated that they are currently working with the IC to develop cross-promotional materials that can be left behind after an appliance is picked up for recycling (Navigant PY2014 EM&V Report, p. 265).

[18] The percent of customers who did not name anything specific plus the customers who described solar, levelized bill or energy assistance, or Residential Energy Report programs is 58%.

Table 17 summarizes the awareness ratings reported in the evaluation reports; however some of these data were not reported for the other programs and therefore could not be included in this table.

Table 17: Awareness of Other GMO Programs

Program	Number of Respondents	Not Aware of Any Other Program (%)
Residential Energy Reports – Treatment Group	700	45%
Air Conditioning Upgrade Rebate Program	52	35%

(Source: Navigant PY2014 EM&V Report, pp. 116, 171).

Marketing

The marketing materials for these programs received mixed reviews. While GMO has developed new tools to promote cross-program participation, the trade allies are still not satisfied with the C&I program outreach materials. The C&I trade allies did not report receiving marketing materials from the implementation contractor or the utility, even though the trade allies would like to use materials provided by the utility as a marketing tool (Navigant PY2014 EM&V Report, p. 87).

Several programs have minimal marketing outreach to customers or key trade allies. For example, marketing the MPOWER program has been non-existent, leaving the program with few participants and prevented the program from achieving its enrolled capacity targets (p. liii). This program has not actively marketed to or recruited small-to-medium sized commercial customers in many years and only markets the program to large customers informally through conversations with utility energy consultants. The program does no direct targeted marketing (Navigant PY2014 EM&V Report, pp. 322-323).

Outreach to the CAP agencies and staff for the Income Eligible Weatherization Program has also been lacking in PY2014. GMO has provided little promotional materials and information about the program to the CAP agencies (Navigant PY2014 EM&V Report, p. 278).

Program staff stated that marketing materials such as the tri-fold brochure were updated with new graphics in early July 2014. They did not co-brand any of the marketing materials with the auditors because GMO plans to change HPwES for PY2016 (Navigant PY2014 EM&V Report, p. 219).

Reasons Driving Participation

High energy bills are not a motivating factor for program participants. This was especially true for the ACUR in which only 11 percent participants cited high utility bills or the ability to save money on their utility bills as their primary consideration (Navigant PY2014 EM&V Report, p. 170).

The most common reason participants started thinking about recycling their appliance was the GMO incentive. Forty-four percent of the ATI participants mentioned the incentive provided by the utility (Navigant PY2014 EM&V Report, pp. 255, 258, 260). Similar findings were reported for the Residential Lighting and Appliance Program (Navigant PY2014 EM&V Report, p. liii).

The most common reasons for purchasing and installing new equipment were malfunctioning or outmoded appliances or air conditioning units (Navigant PY2014 EM&V Report pp. li,173)

In addition, the HPwES participants are installing recommended measures themselves rather than having a certified HERS rater or contactor do the work. Specifically, some participants installed recommended measures from the Home Energy Assessment themselves, likely in an effort to save money. However, the customer may not be aware of quality installation practices required to maximize savings potential while improper installation could pose risks to the customer's health, safety, and comfort (Navigant PY2014 EM&V Report, p. 223).

Program Design

Several GMO programs underwent significant changes during PY14. These changes included removing two of the programs' three highest savings measures, refrigerators and programmable thermostats in the RLA Program (Navigant PY2014 EM&V Report, pp. xxiv, 202, 207).

Going forward, the HLR Program will experience significant changes including a planned phase out of all CFLs in place of LEDs (Navigant PY2014 EM&V Report, p. 304).

The Energy Optimizer's program will likely be affected by a change in the thermostats used by some program participants in urban areas. Specifically, Honeywell plans to discontinue production and support of older-technology thermostats that are non-Wi-Fi enabled and are capable only of one-way communication through a paging system. These thermostats are prevalent in urban areas, which jeopardize program participation for affected customers (Navigant PY2014 EM&V Report, pp. liv, 349).

Communication

Two programs have excellent communications strategies in place, which have been critical to the overall success of the HLR and Energy Optimizer Programs (Navigant PY2014 EM&V Report, pp. liii, liv). This also indicates a high degree of cooperation and information sharing between the utility program staff and HLR Program implementers (Navigant PY2014 EM&V Report, p. 299).

However, there are serious communication challenges for the Income-Eligible Weatherization Program**.** Communication, data sharing, and cooperation between the utility program staff and implementers at the CAPs is limited, and this limits the program's effectiveness. Program staff and participating CAPs have no regularly scheduled meetings or events, and share information intermittently and communicate irregularly (Navigant PY2014 EM&V Report, p. 277).

Current record keeping and lack of communication between the program manager and customers may inhibit the MPower's program performance. Some customers either had been dropped from the program without their knowledge or were not sure if they were still participants in a load curtailment program (Navigant PY2014 EM&V Report, p. 324).

Program Operations

Several programs are operating in accordance to their program designs. Specifically, the HLR Program's planning documents, flow diagrams, and quality assurance/quality control (QA/QC) procedures suggest a well-designed program (Navigant PY2014 EM&V Report, p. 307). Despite

lacking a formal written theory and logic model, the program was designed, managed, and implemented in a coherent manner with well-defined rules, guidelines, and roles (Navigant PY2014 EM&V Report, p. 308).

The MPOWER program has not been tested in recent years, which makes future program operations uncertain. Due to the relatively low price of electricity and other factors, the utility has not needed to call a curtailment event in years. As a result, the utility does not know if the current six participants are to respond to an event (Navigant PY2014 EM&V Report, pp. 316, 322).

Application Processing

The C&I Custom and Standard Rebate Program experienced significant delays in application processing times in PY2014 (Navigant PY014 EM&V Report, p. xl, 82). These slow processing times limited the trade allies' ability to submit multiple projects to the program as they reported application processing times of three months or longer (Navigant PY014 EM&V Report, pp. xl, xlvii, 72, 74, 75, 77).

Role of Trade Allies

The GMO programs still do not have participating trade allies serving significant portions of its service territory. This is especially problematic for the ACUR program, as there are geographic areas in GMO territory with high concentrations of customers but no trade allies that can deliver to program to customers in several of its most populous towns in service territory (Navigant 2014 EM&V Report, pp. lii, 170, 176-178).

QA/QC

Inspection and verification procedures have improved for two programs in PY2014. The ACUR has recently codified the random inspections procedures at a rate of five percent of tune-ups and five percent of replacements, and inspections are automatically conducted if a customer complains about a project or if a contractor is found negligent. Now, there are multiple layers of verification being conducted as part of the program (Navigant PY2014 EM&V Report, p. 179).

In addition, the HLR Program implementation contractor provided a detailed written QA/QC document that guides their program implementation process (Navigant PY2014 EM&V Report, p. 308).

Areas for Program Improvement

The program staff and implementation contractors also identified several ways in which these programs could be improved going forward. These suggestions are summarized next.

GMO should increase trade ally outreach and training, especially for the ACUR Program. Specifically, participating trade allies should be taught how to market the program's energy saving benefits to their customers. Furthermore, program marketing should focus on other benefits, including increased home comfort and improved HVAC system performance, to increase participation in the ACUR Program (Navigant PY2014 EM&V Report, p. 175).

Recruiting more retail participants in rural areas would help the HLR program better serve rural customers. (Navigant PY2014 EM&V Report, p. 176)

The ATI Program should offer more flexibility to accommodate customers' schedules. If the program wants to increase the overall participant satisfaction, it should focus on increasing the availability of pick-up appointments. Also, tracking the dates of key project milestones (initial application dates, appliance pick-up dates, rebate distribution dates) will allow the program manager to track the progress of individual projects and ensure that projects are being processed in a timely manner.(Navigant PY2014 EM&V Report, p. 260).

The materials used to explain the RER have led to customer confusion and complaints and therefore should be changed. Twelve percent of the customers complained that the comparison to neighbors is not accurate. Several complaints stem from participants who compare bills with actual neighbors and find they are paying less. The program's introductory mailer indicates that household comparisons rely on similarities in square footage and fuel types, but the monthly mailers do not include detail on square footage as a comparison factor, which may lead recipients to conclude it is not. This comparison information may not be explained in sufficient detail or frequency to assure a skeptical report reader (Navigant PY2014 EM&V Report, p. 129).

There is no official implementation contractor for the MPower program, which has adversely affected program performance. Because a peak event has not been called in several years, the effectiveness of relationships and communication between these various program actors has not been tested in recent years. Off-season processes carried out by these parties are not streamlined Navigant PY2014 EM&V Report, pp. 334-335).

To reduce program costs, the utility could improve coordination of efforts between program actors for the MPower program. GMO could help ensure accurate meter data transfer among implementation contractors by facilitating meetings or training. Field staff could accompany utility energy consultants to check on meters during the off-season when consultants are making site visits to these large customers (Navigant PY2014 EM&V Report, p. 335).

The process evaluations identified several "best practices" from the California benchmarking tool[19]that will improve overall program operations. These recommendations included incorporated feedback loops into the program logic model, conducting regular research on market conditions, formalizing training and marketing to vendors, providing sales training to trade allies, and developing formal criteria for pre- and post-project inspections (Navigant PY2014 EM&V Report, pp. 87, 306).

GMO should also develop targeted marketing materials to low-income customers as a way to increase overall program effectiveness, based on a review of industry best practices. One of the largest areas for improvement identified by the California Best Practices Benchmarking activity was to improve its marketing materials and strategies (Navigant PY2014 EM&V Report, p. 276).

[19] www.eebestpractices.com

2.2 Status of Previous Process Recommendations

Status of PY2010 Recommendations

The PY2010 process evaluation report suggests that while the Income-Eligible Weatherization program was making progress, it was not achieving savings targets in a cost-effective manner, and the report made several suggestions to improve performance. The PY2010 report suggested improving data tracking procedures and sharing of data between CAPs and the utility, building in a quality control procedure to its data tracking system, decreasing the wait time between application and project completion, and decreasing eligibility roadblocks.

While the program manager did not provide details as to how these previous suggestions may have been incorporated into program delivery, Navigant's research suggests that most of these improvements have likely not been implemented. As participation remains low, it is possible these problems persist and have not been thoroughly addressed. The program should conduct participant surveys as part of future process evaluation activities in order to gauge whether the program has successfully resolved these participation bottlenecks and satisfaction issues[20] (Navigant PY2014 EM&V Report, pp. 284-285).

The MPower program has not fully implemented program improvement suggestions from past evaluation reports. Many of the areas for improvement suggested in the most recent complete process evaluation for the program in 2010 are no longer relevant because the scale and participant makeup of the program have changed. The following recommendations remain relevant and program progress toward achieving them will be addressed in this section. (1) Review contract terms for customers that have been identified as having their FPLs set too high; (2) provide a more detailed explanation of the program to participants during enrollment; (3) contact as many participants as possible immediately after an event via email to increase participant perception of timely feedback and ensure accuracy of contacts for participants with multiple sites; and (4) consider incorporating a 5-minute grace period at the beginning or end of every event into the penalty calculation (Navigant PY2014 EM&V Report, pp. 328-331)

Energy Optimizer's program manager was unable to provide specific guidance as to whether previously suggested improvements had been incorporated into program marketing and delivery. Suggestions from PY2010 process evaluation include:

- More consistently offer pre-cool and opt-out options to customer considering leaving the program;
- Provide more technical assistance to reduce dissatisfaction;
- Screen applicants for factors that will make them most likely to benefit from the program (over 65, home all day, etc.) and target these groups;
- Ensure advertising promises only what it can deliver;

[20] Participant surveys are not included in the 2015 EM&V plan, but should be considered for the next program evaluation cycle.

- Consider offering a max temperature program option for businesses that allows them to specify a maximum temperature their business can reach before the air conditioning will return to normal functioning; and
- Tailor the technical features of thermostats offered to small commercial participants specifically to the needs of commercial customers.

Most recommendations were implemented including allowing customers to pre cool their facilities and providing increased opt-out days per year, to increase program satisfaction and decrease attrition. To improve technical assistance, the program now has 24-hour technical assistance, dispatching technicians as needed. However recommendations 5 and 6 were not viewed as technically feasible (Navigant PY2014 EM&V Report, p. 355).

Status of PY2013 Recommendations

The following recommendations were addressed in the PY2014 process evaluations.

- ***GMO should investigate ways to promote cross-program participation as a well as build overall program awareness*** (Navigant PY2013 EM&V Report, pp. xliii, xliv, xlix, l, 117, 121, 124-125).
- ***GMO should consider adding an upstream residential lighting program to its current portfolio*** (Navigant PY2013 EM&V Report, p. xix, 88). GMO launched a residential upstream lighting program, HLR Program, which offers in-store discounts on standard and specialty CFL and LED residential lighting through a variety of retailers (Navigant PY2014 EM&V Report, p. xlii).
- ***GMO should consider expanding its trade ally networks to serve the eastern and northern portions of its territory*** (Navigant PY2013 EM&V Report p. 142). This remains an ongoing issue as identified in the process evaluations of these programs. The implementer attempted to recruit trade allies to serve customers in less populated areas with limited success. The contractors report not participating because they do not have enough GMO customers to be worth the effort. The implementer has continued outreach to these towns in PY2015 (Navigant PY2014 EM&V Report, p. xlii).

However, the PY2014 process evaluations did not address the current status of the following recommendation from last year's report:

- ***GMO could investigate opportunities to increase understanding of the magnitude of customers' expected energy savings and of the other factors that could influence a customer's energy consumption*** (Navigant PY2013 EM&V Report, p. xix, 88)

2.3 Summary of PY214 Process Evaluation Recommendations

The process evaluations included 44 recommendations on specific ways in which GMO could improve its current program offerings. The key recommendations are grouped by topic area while details for each specific recommendation are provided in the Navigant PY2014 evaluation report.

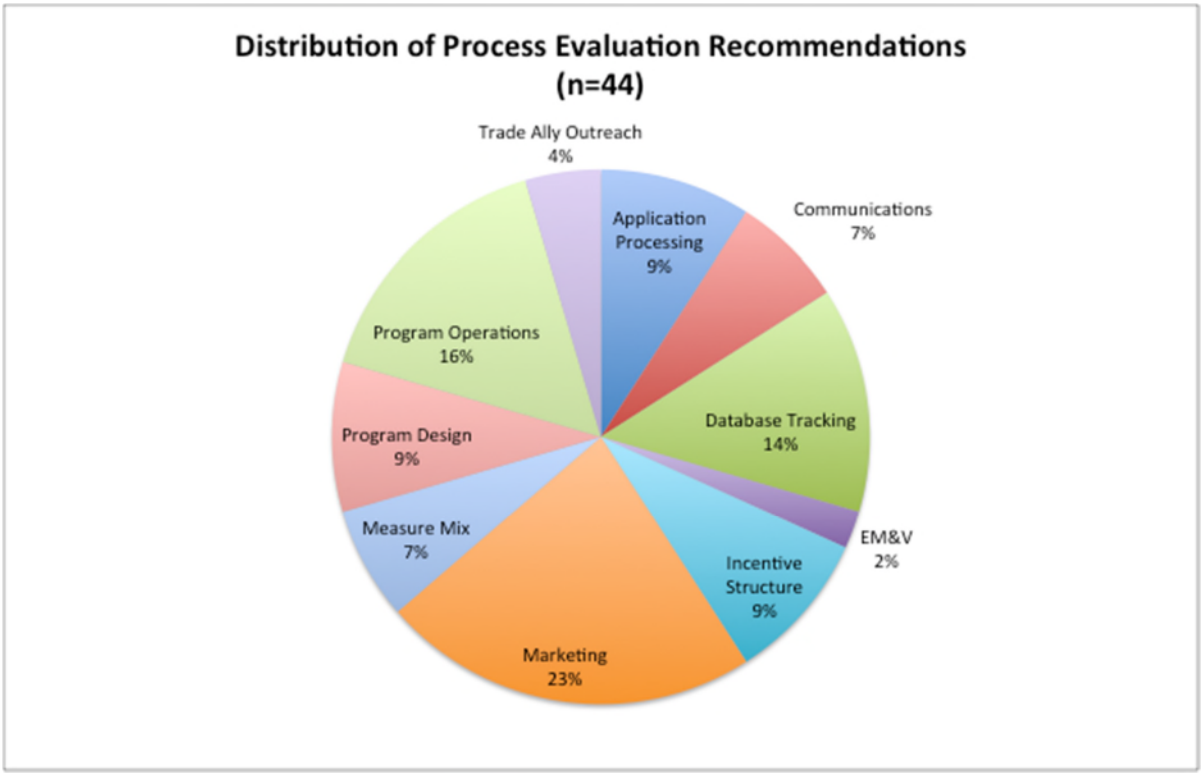


Figure 4: Distribution of Process Evaluation Recommendations by Topic Area

Marketing

The program evaluators provided eight recommendations on ways to improve current program outreach strategies including:

- *Provide more specific marketing pieces and literature targeting trade allies to enhance their participation in the C&I Custom and Standard Program and the ACUR Program* (Navigant PY2014 EM&V Report, pp. xlivii, xlix, 69, 167);
- *Include more information about technologies in marketing and outreach materials to educate customers about LEDs* (Navigant PY2014 EM&V Report, pp. xliv, 210);
- *Emphasize the non-energy benefits of program participation to both customers and contractors such as increased comfort or the benefits of recycling old equipment* (Navigant PY2014 EM&V Report, pp. xlix, 234)
- *Incorporate the broader message of cross-program promotion in marketing and outreach tools* (PY2014 EM&V Report, pp. xliii, l, 117, 125);
- *Continue to use bill inserts to increase overall program awareness for residential programs* including the ACUR, the ATI, and the RLA programs (Navigant PY2014 EM&V Report, pp. xlix, lii, 173, 263); and

- *Continue to support in-store advertising for the RLA Program* (Navigant PY2014 EM&V Report, p. 205).

Related to marketing, the evaluators also provided recommended increasing trade ally outreach and recruitment by targeting towns with more populations of more 6,000 that currently have minimal trade ally participation (Navigant PY2014 EM&V Report, pp. l, 170, 176, 212).

Program Design

The program evaluators also made four recommendations on ways to specifically improve program design, which are summarized next:

- *Focus on small-to-medium sized commercial customers who do not require diesel backup generation for the MPower program* (Navigant PY2014 EM&V Report, p. 322);
- *Expand the customer targets to for the ACUR Program and HLA to include multifamily buildings and small businesses* (Navigant PY2014 EM&V Report, pp. 170, 298) ;
- *Reexamine the current program design for its RLA* (Navigant PY2014 EM&V Report, p. 280); and
- *Broaden the target audience for the RER Program* (Navigant PY2014 EM&V Report, p.129).

Measure Mix

The evaluation team also recommended revising the current program measure mix for the following programs:

- *Add standard LED offering for the C&I Custom and Standard Program* (Navigant PY2014 EM&V Report, pp. xlviii, 72);
- *Include emerging consumer products such as smart (Wi-Fi enabled) thermostats and other connected appliances in the Residential Lighting and Appliance Program* (Navigant PY2014 EM&V Report, pp. liv, 181); and
- *Incorporate a bulb offerings planning tool that will optimize the bulb mix throughout the Home Lighting Rebate Program's life cycle and ease the transition from CFLs to LEDs* **(**Navigant PY2014 EM&V Report, pp. liii, 302).

Incentive Structure

The evaluators also provided four recommendations on ways to revise the current incentive structures. Specifically, they recommended:

- *Review and revise the current incentive amounts* offered in the two program components of the C&I Custom and Standard Program (Navigant PY2014 EM&V Report, p. 72);
- *Increase incentives during shoulder season months for the ACUR Program (*Navigant PY2014 EM&V Report, p. 170)*;* and
- *Offer bonus incentives for customers who participate in other GMO programs, such as ACUR Program and the HPwES program* (Navigant PY2014 EM&V Report, pp. li, 170).

Program Operations

The process evaluations offered seven recommendations on ways in which GMO's program operations could be improved or enhanced, which are summarized next:

- *Discontinue the Multifamily Rebate and ESNH Programs* (Navigant PY2014 EM&V Report, pp. 96, 235);
- *Provide more clarity and transparency in the RER reports, especially regarding the cohort comparison process* (Navigant PY2014 EM&V Report, p. 128);
- *Develop and implement better guidance documents for the Home Energy Raters inspections in conjunction with the HPwES Program* (Navigant PY2014 EM&V Report, p. 221);
- *Increase involvement with the CAP agencies to identify better ways to improve participation rates for the Income-Eligible Weatherization Program* (Navigant PY2014 EM&V Report, p. 277); and
- *Focus more on the load curtailment programs, both MPower and Energy Optimizer, to ensure that they are operating effectively*. The recommended activities included calling curtailment events for both programs, and closely monitoring current participation, budgets, marketing, and outreach activities to streamline program activities and provide GMO with a way to gauge overall program effectiveness (Navigant PY2014 EM&V Report, pp. 316-317, 326, 331).

Application Processing

The evaluators provided several recommendations on ways in which the C&I Custom and Standard Programs could improve their application processing by reinstating the online application process, ensuring a better rebate funding process by setting up an escrow account and offering additional training for both the program implementer and trade allies to minimize confusion and address concerns **(**Navigant PY2014 EM&V Report, pp. xl, xlivii, 72).

Communications

The evaluators also recommended that GMO hold regular meetings to encourage information sharing, enhance data tracking, and overall program operations with the DR implementation contractors and CAP agencies (Navigant PY2014 EM&V Report, pp. lii, 277, 278, 324, 349).

Database Tracking

The program evaluators also provided five recommended on ways to improve database tracking across the GMO programs:

- *Ensure that all the project information is being transferred from the program implementer's database into its own tracking databases so that the program manager can track project progress and completeness and trade ally compliance with program procedures for the ACUR Program* (Navigant PY2014 EM&V Report, p. 163);
- *Track all the major project milestones for key program metrics for all applications in the main database* (Navigant PY2014 EM&V Report, pp. 224, 260);
- *The program staff and implementer should keep up-to-date and complete contact information to maintain regular communication with participants with the MPower Program* (Navigant PY2014 EM&V Report, p. 326); and

- *Capture total project costs on the project and detailed measure-level participation data for the Income-Eligible Weatherization Program* (Navigant PY2014 EM&V Report, p. 280).

Evaluation, Measurement & Verification (EM&V)

The program evaluators also recommended that future process evaluations of the Energy Optimizer program include participant surveys to gauge both customer satisfaction and understand reasons for customer attrition (Navigant PY2014 EM&V Report, p. 350).

Section 3: Cost-Effectiveness Analysis

Benefit-Cost Methodology

Navigant performed cost-benefit analyses using the five standard benefit-cost ratios: Total Resource Cost (TRC) Test, Societal Cost Test (SCT), Program Administrator Cost Test (PACT), Participant Cost Test, (PCT) and Ratepayer Impact Measure (RIM) Test, following the 2001 California Standard Practice Manual (SPM) and the subsequent 2007 SPM Clarification Memo (Navigant PY2014 EM&V Report, pp. xxxiii, 13).

The cost benefit section of the report provides a list of included costs; and discussions on the application of different of discount rates and for the treatment of free riders (Navigant PY2014 EM&V Report, pp. xxxiv, 13).

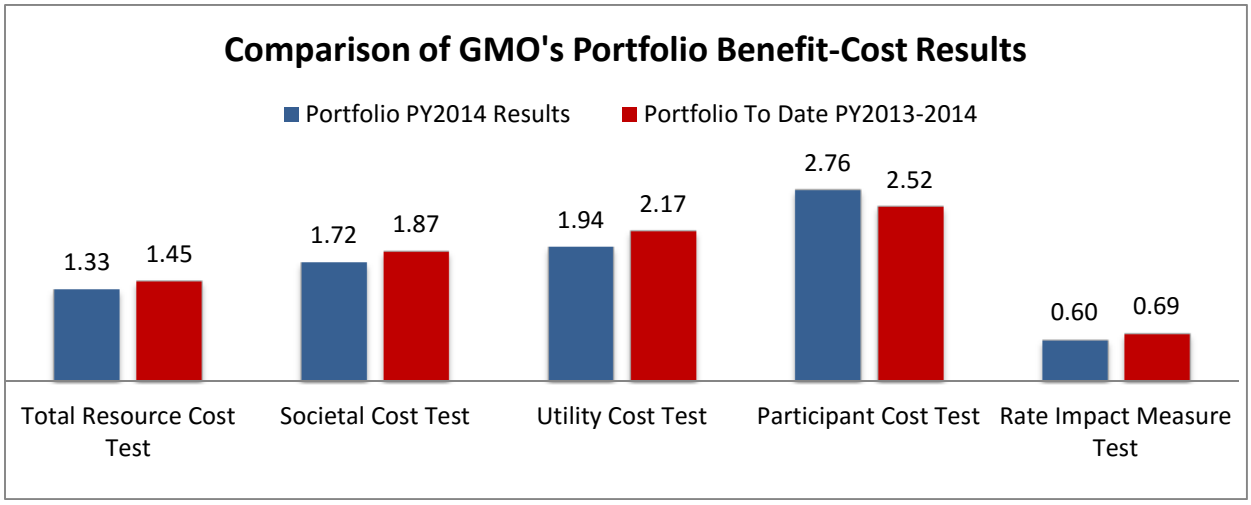
An extensive discussion of the allocation of costs for the early retirement of air conditioners in the ACUR Program is provided (Navigant PY2014 EM&V Report, p. 14).

Navigate used an NTG of 1.0 for all programs except ATI and the CFLs rebated through the Home Lighting Rebate programs. Navigant stated that the assumption is consistent with values used in the PY2013 report (Navigant PY2014 EM&V Report, p.15 and Table 1-9).

Assumptions developed by Navigant, and not provided by GMO, include energy and peak demand savings, EUL and RUL values and participant equipment costs (Navigant PY2014 EM&V Report, p. 15).

Cost-Effectiveness Results

GMO's overall program portfolio is cost-effective for PY2014. As Figure 5 shows, GMO's overall energy efficiency and DR portfolio continues to be cost-effective. In addition, the benefit-cost ratios are improving slightly over the program period, especially for the TRM and UCT tests.



(Source: Navigant PY2014 EM&V Report, p. xxxvii)

Figure 5: Comparison of GMO's Portfolio Benefit-Cost Results

As Figure 6 illustrates, the energy efficiency programs are cost-effective across all tests, except for the RIM test. Moreover, these UCT results are slightly improving as the program period continues.

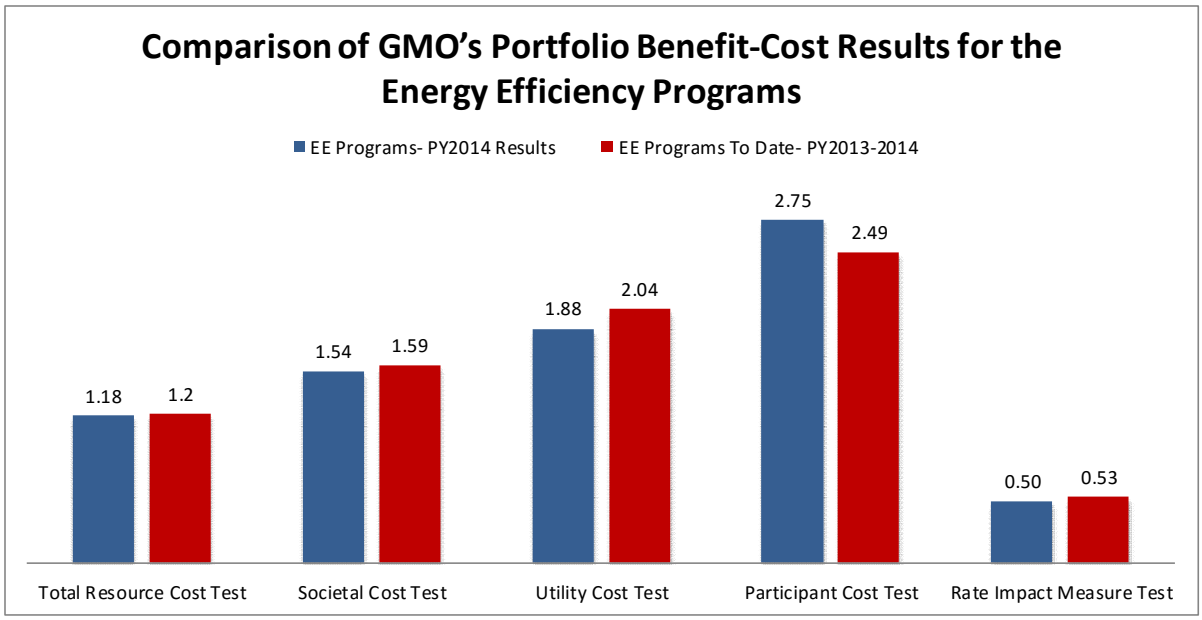


Figure 6: Comparison of GMO's Portfolio Benefit-Cost Results for the Energy Efficiency Programs

Both of GMO's DR programs continue to be very cost-effective both on an annual and cumulative basis. These programs also pass all of the benefit-cost tests, including the RIM as Figure 7 shows.

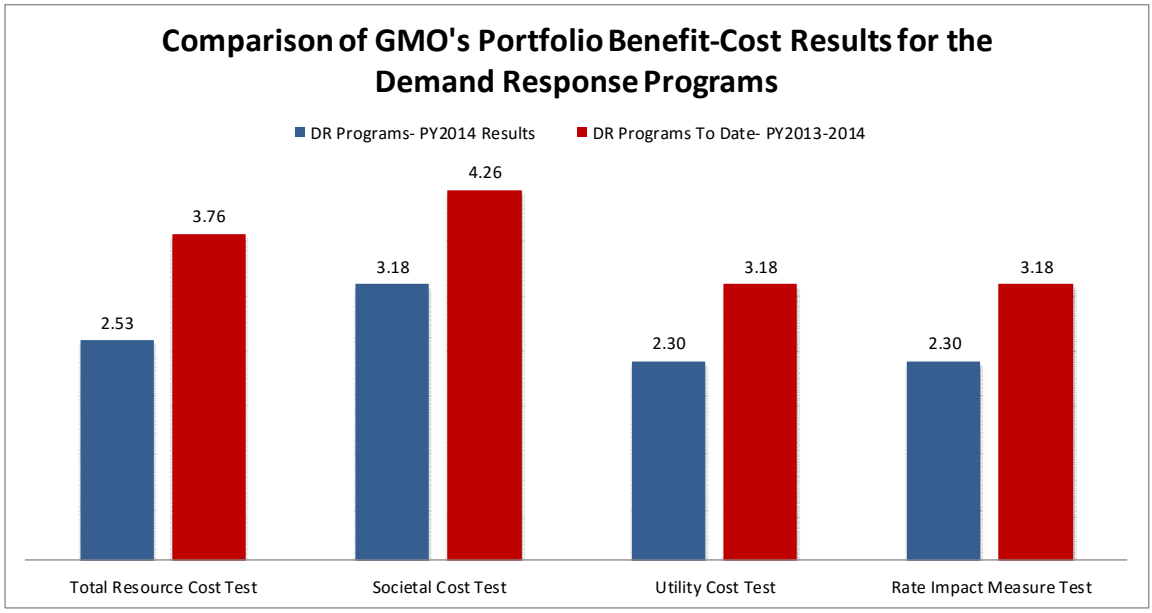


Figure 7: Comparison of GMO's Portfolio Benefit-Cost Results for the Demand Response Programs

However, cost-effectiveness varies considerably across program on a cumulative basis. The C&I Programs as cost-effective across all the tests, with the exception of the RIM test (Navigant PY2014 EM&V Report, p. xxxvii). These differences are highlighted in Table 18.

Table 18: Benefit-Cost Ratios by Program and Cost Test - Program to Date - PY2013-PY2014

	Program	Total Resource Cost Test	Societal Cost Test	Utility Cost Test	Participant Cost Test	Rate Impact Measure Test
C&I EE Programs	C&I Custom Rebate	1.44	1.96	2.71	2.27	0.61
	C&I Prescriptive Rebate	1.59	2.05	2.51	2.81	0.61
Residential EE Programs	Multi-Family Rebate	0.06	0.08	0.06	5.23	0.06
	Residential Energy Report	0.70	0.70	0.68	INF*	0.29
	Air Conditioning Upgrade Rebate Program	0.90	1.26	1.74	1.27	0.67
	Residential Lighting & Appliance	0.45	0.56	0.33	6.55	0.19
	Home Performance with ENERGY STAR®	0.39	0.53	1.86	0.51	0.65
	ENERGY STAR® New Homes	1.15	1.60	1.15	2.82	0.57
	Appliance Turn In Program	0.83	0.98	0.67	INF*	0.26
	Income-Eligible Weatherization	0.39	0.53	0.62	0.80	0.41
	Home Lighting Rebate Program	2.33	2.59	3.42	9.08	0.32
DR Programs	MPower	5.20	5.14	0.99	INF*	0.99
	Energy Optimizer	3.69	4.23	3.69	0.00	3.69
*Ratios are infinite because there are positive benefits and not participant costs.						

(Source: Navigant PY2014 EM&V Report, p. xxxvi)

Both the Custom and Standard C&I program offerings are cost effective as Table 18 shows Navigant PY2014 EM&V Report, p. 64). In addition, four programs have positive TRC and UCT results, with the HLR Program showing a cost-effectiveness ratio of 2.33 for the TRC and 3.42 for the UCT. Other cost-effective residential programs include the ESNH Program, which was discontinued due to low participation rates but still had cost-effectiveness ratios of 1.15 for the TRC and 2.82 for the UCT.

The other residential programs did not pass the TRC test based on program results to date (Navigant PY2014 EM&V Report, pp. xxxvi, 93, 111, 165, 200, 254, 274).

Both of GMO's demand response programs pass the TRC test nearly meet the UCT tests as well (Navigant PY2014 EM&V Report, pp. 321, 344).

Section 4: EM&V Auditor Findings and Recommendations

As presented in the three-year evaluation, measurement, and verification (EM&V) Plan[21], Navigant developed a multi-year evaluation strategy to provide GMO and stakeholders with the best information possible over the course of the program cycle within the available evaluation financial resources. Navigant's plan concentrates on those programs with the greatest contribution to overall portfolio savings (Navigant PY2013 EM&V Report, pp. xv, 2)

In year one, for the impact evaluation, Navigant completed a detailed review of all data contained in the tracking system as well as the algorithms and/or deemed savings values used for ex-ante savings estimates. The methodologies used to complete this review are summarized in Table 19.

Table 19: Summary of Impact Evaluation Methodologies Used in the EM&V Reports

Program		Tracking System and Database Review	Engineering Review & Analysis	Participant Telephone Surveys	Billing Analysis	On Site Verification & Metering
C&I EE Programs	C&I Custom Rebate Program	✓	✓			✓
	C&I Prescriptive Rebate Program	✓	✓			✓
Residential EE Programs	Multifamily Rebate Program	✓				
	Residential Energy Report Program	✓			✓	
	Air Conditioning Upgrade Rebate Program	✓	✓	✓	✓	
	Residential Lighting and Appliances Program	✓	✓	✓		
	Home Performance with ENERGY STAR®	✓				
	ENERGY STAR® New Homes	✓				
	Appliance Turn-In Program	✓	✓	✓		
	Income Eligible Weatherization	✓	✓			
Demand Response Programs	MPower Program	✓				
	Energy Optimizer Program	✓				

(Source: Navigant PY2013 EM&V Report, pp. xx)

[21] Evaluation, Measurement, and Verification Plan: GMO Energy Efficiency and Demand Response Program 2013-2015 prepared by Navigant. October 2013.

To complete the PY2014 process evaluations, Navigant used eight primary evaluation activities to inform the process evaluations:

1. Program manager and implementer interviews
2. Review of recent evaluations
3. Review of Key Operational Metrics
4. Review of marketing materials
5. Review of Quality Assurance and Quality Control Procedures
6. Participant surveys, including fast feedback and end-of-year surveys
7. Trade ally surveys
8. Geographic analysis of applications and trade allies.

These activities are summarized by program in Table 20.

Table 20: Summary of Process Evaluation Activities-PY2014

Programs		Program Manager and Implementer Interview	Review Recent Evaluation	Review of Key Operational Metrics	Review of Marketing Materials	Review of QA/QC Procedures	Number of Participants Surveys (2014)		Number of Trade Ally Surveys (2014)
							Fast Feedback	End of Yr.	
C&I EE Programs	Custom	2014	2014	2014	-	2014	62	10	20
	Standard	2014	2014	2014	-	2014	25	15	20
Residential EE Programs	Multifamily Rebate Program	2014	2014	2014	2014		-	-	-
	Residential Energy Report Program	2014	2014	2014	2014	2014	-	1,001[22]	-
	Air Conditioning Upgrade Rebate Program	2014	2014	2014	2014		388	41	-
	Residential Lighting and Appliance Program	2014	2014	2014	-		-	50, 66	-
	Home Performance with ENERGY STAR®	2014	2014	2014			-	29, -	-
	ENERGY STAR® New Homes	2014	2014	2014	2014		-		-
	Appliance Turn-In Program	2014	2014	2014			557	62	-
	Income-Eligible Weatherization Program	2014	2014	2014	2014		-	-	-
	Home Lighting Rebate Program	2014	2014	2014	2014		-	-	-
DR Programs	MPower	2014	2014	2014	2014		-	12	-
	Optimizer	2014	2014	2014	2014		-	-	-

(Source: Navigant analysis – PY2014 EM&V Report, p. xxxix)

[22] The participant survey of the Residential Energy Reports program was conducted by the program IC.

4.1 Summary of 4 CSR 240-22.070(8) Requirements

As part of the 4 CSR 240-22.070(8) requirements, the program evaluations were required to meet specific requirements specified in 4 CSR 240-22.070(8).

Impact Evaluation Findings

None of the PY2014 impact evaluations included a summary of the ways in which the requirements as described in 4 CSR 240-22.070(8). Requirements were addressed. Therefore, the EM&V Auditor was unable to assess the degree to which these impact evaluations the MEEIA requirements. This oversight should be corrected in the final report.

> *(B) Impact Evaluation. The utility shall develop methods of estimating the actual load impacts of each demand-side program and demand-side rate included in the utility's preferred resource plan to a reasonable degree of accuracy.*
>
> *1. Impact evaluation methods. At a minimum, comparisons of one (1) or both of the following types shall be used to measure program and rate impacts in a manner that is based on sound statistical principles:*
>
> *A. Comparisons of pre-adoption and post-adoption loads of program or demand side rate participants, corrected for the effects of weather and other intertemporal differences; and*
>
> *B. Comparisons between program and demand-side rate participants' loads and those of an appropriate control group over the same time period.*
>
> *2. The utility shall develop load-impact measurement protocols that are designed to make the most cost-effective use of the following types of measurements, either individually or in combination:*
>
> *A. Monthly billing data, hourly load data, load research data, end-use load metered data, building and equipment simulation models, and survey responses; or*
>
> *B. Audit and survey data on appliance and equipment type, size and efficiency levels, household or business characteristics, or energy-related building characteristics.*
>
> *(C) The utility shall develop protocols to collect data regarding demand-side program and demand-side rate market potential, participation rates, utility costs, participant costs, and total costs. (AUTHORITY: sections 386.040, 386.250, 386.610, and 393.140, RSMo 2000.* Original rule filed June 12, 1992, effective May 6, 1993. Amended: Filed Oct. 25, 2010, effective June 30, 2011.*
>
> **Original authority: 386.040, RSMo 1939; 386.250, RSMo 1939, amended 1963, 1967, 1977, 1980, 1987, 1988, 1991, 1993, 1995, 1996; 386.610, RSMo 1939; and 393.140, RSMo 1939, amended 1949, 1967.* 4 CSR 240-22.080 Filing Schedule, Filing

The following table summarizes the ways in which these methodologies were used in the impact evaluations based on the EM&V Auditor's analysis of the PY2014 program evaluation.

Table 21: Summary of 4 CSR 240-22.070(8) Impact Evaluation Requirements Completed in PY2014

Program	Comparisons of pre-adoption and post-adoption participant rates	Comparison between participants and control groups over time	Monthly billing data, hourly data, load research data, end use load metered data, simulations and survey responses	Audit and survey data on appliance and equipment type, size and efficiency levels, household or business characteristics or energy-related building characteristics	Develop data collection protocols, participation rates, utility costs, participant costs, and total costs
C&I Custom Rebate Program	✓			✓	✓
C&I Prescriptive Rebate Program	✓			✓	✓
Multifamily Rebate Program	✓				✓
Residential Energy Report Program	✓	✓ X			✓
Air Conditioning Upgrade Rebate Program	✓	✓			✓
Residential Lighting and Appliances Program	✓				✓
Home Performance with ENERGY STAR®	✓				✓
ENERGY STAR® New Homes	✓				✓
Appliance Turn-In Program	✓			✓	✓
Income Eligible Weatherization	✓				✓
MPower Program	✓				✓
Energy Optimizer Program	✓				✓

(Source: Derived from Navigant PY2014 analysis; not explicitly reported)

Process Evaluation Findings

In the draft report, the EM&V Auditor noted that Navigant had not fully addressed these issues in its PY2014 Report. However, for the most part, this issue was corrected and the key findings for each question are summarized in the following Tables 22-26. Note, however, that many of these responses duplicated the previous analysis completed in PY2013.

4 CSR 240-22.070(8) Issue #1: *What are the primary market imperfections common to the target market segment?*

1. What are the primary market imperfections that are common to the target market segment?

Table 22: Summary of Findings for 4 CSR 240-22.070(8) Issue #1

4 CSR 240-22.070(8) Issue #1: What are the primary market imperfections common to the target market segment?		
Program	**PY2013 Response**	**PY 2014 Update**
C&I Standard and Custom Program	The C&I Standard and Custom Programs address several market imperfections of the target market of all commercial and industrial customers: 1) first cost barrier and 2) limited customer awareness.	No changes
Multifamily Rebate Program	N/A	The primary market imperfections that are common to the multi-family market include 1) the split incentives resulting from dwelling units being independently metered so building owners or managers have less incentive to invest in efficiency measures and 2) low customer awareness of the benefits of energy efficiency measures and the potential to reduce energy use and save money over time.
Residential Energy Reports	N/A	The RER Program addresses two market imperfections fundamental to residential customers: 1) the information asymmetry between the energy end user and the energy provider regarding how end-use behaviors contribute to the monthly bill, and 2) awareness of cost-effective strategies to reduce energy use in the home.
Air Conditioning Upgrade Rebate Program	N/A	The ACUR programs address several market imperfections of the target market of all residential customers: 1) additional incremental cost associated with high-efficiency units and 2) the length of the payback period.
Residential Lighting and Appliance Program	The targeted market segment for the RLA Program include all residential customers within the GMO territory and specifically those who are in the market for new home appliances. The program secondarily targets the residential lighting market, residential customers who have aging appliances that are either broken or malfunctioning. The higher initial cost of high-efficiency appliances is a deterrent to making these purchases.	In PY2014, the program removed two measures—refrigerators and programmable thermostats—due to the low cost-effectiveness of these measures. By doing so, the program responded to changes in the residential appliance market, where high-efficiency refrigerators and programmable thermostats are now commonplace and customers do not need additional incentives to purchase these measures.
Residential Lighting and Appliance Program	N/A	The program staff also stated that they are considering distributing LED lamps instead of CFLs to RLA Program participants.

4 CSR 240-22.070(8) Issue #1: What are the primary market imperfections common to the target market segment?		
Program	**PY2013 Response**	**PY 2014 Update**
Home Performance with Energy Star®	N/A	The HPwES program addresses the following imperfections of the target market of residential customers who are homeowners of a single-family home 1) lack of customer awareness of the improvements that can be made to increase the energy efficiency of their home, 2) the cost associated with energy-efficiency projects and products, and 3) the inability of customers to locate a certified HERS rater.
Energy Star® New Homes	N/A	The primary market imperfections that are common to the target market of the ESNH program are a) increasing building specifications from ENERGY STAR® version 2.5 to the more efficient requirements of ENERGY STAR® version 3.0 and b) low customer awareness of the value of buying an ENERGY STAR® certified home.
Appliance Turn-In Program	N/A	The ATI program addresses two major market imperfections of the target market of all residential customers in the GMO service area: 1) lack of momentum in customer decision-making and action, and 2) lack of awareness of recycling procedures for large appliances.
Income-Eligible Weatherization Program	N/A	The target market for this program is weatherization of low-income residences, both owned and rented. The primary difficulty in this market is the inability of low-income residents to afford professional home weatherization services. Low-income customers benefit usually cannot afford the up-front costs of home weatherization, and the payback period is too lengthy to make it cost-effective for these customers.
Home Lighting Rebate Program	N/A	There are three primary market imperfections common to the efficient home lighting market are lengthy payback period for LEDs, relatively highly upfront costs of efficient CFL and LED bulbs; and lack of customer awareness
M Power	N/A	The primary market imperfection the MPower program addresses is the lack of an incentive for customers to curb demand during peak periods.
Energy Optimizer	N/A	The primary market imperfection the Energy Optimizer program addresses that customers have little incentive to reduce usage during peak periods given the price structures in place at most utilities.

(Sources: Navigant PY2014 EM&V Report, pp. 67, 93, 112, 166, 201, 218, 233, 255, 275, 298, 322, 345)

2. Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?

Table 23: Summary of Findings for 4 CSR 240-22.070(8) Issue #2

4 CSR 240-22.070(8) Issue #2: Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?		
Program	**PY2013 Response**	**PY 2014 Update**
C&I Standard and Custom Programs	The target market for these two programs is all C&I customers within GMO territory, regardless of size or rate class. The presence of the Custom Program in addition to the Standard Program ensures that larger customers with more complex systems and energy efficiency needs are able to participate in the GMO program offerings.	None
Multifamily Rebate Program	N/A	The target market segment is appropriately defined for the Multi-Family Rebate Program. It includes residential customers in existing multi-family buildings with two or more dwellings.
Residential Energy Reports	N/A	The target market segment for the RER Program is appropriately defined as residential customers with the highest energy consumption. The program could consider expanding the program to income-eligible customers.
Air Conditioning Upgrade Rebate Program	N/A	The target market segment for the ACUR programs includes residential customers with working inefficient HVAC systems. The program should consider opening up the program to very small businesses and multi-family complexes. These customers likely have the same type of units as residential customers and would greatly benefit from the tune-up and associated rebate.
Residential Lighting and Appliance Program	The target market for this program is all residential customers within GMO territory who are in the market for new home appliances. The program only reaches a small subset of the total residential market for lighting.	N/A

4 CSR 240-22.070(8) Issue #2: Is the target market segment appropriately defined, or should it be further subdivided or merged with other market segments?		
Program	PY2013 Response	PY 2014 Update
Home Performance with Energy Star®		The target market segment for the HPwES program includes residential customers in the GMO territory who are homeowners of a single-family unit. The target market for this program is appropriately defined so as to attract the broadest number of eligible participants.
ENERGY STAR® New Homes Program	N/A	The target market segment for the ESNH program is appropriately defined: builders of new single-family and multi-family homes that are three stories or less in GMO's residential territory. Multi-family buildings that are greater than three stories can be included in the segment if deemed residential by local building codes and each unit has its own heating, cooling, and hot water system.
Appliance Turn-In Program	N/A	The target market for this program is all residential customers within GMO territory. While this is in line with similar programs at other utilities, these programs sometimes also work with businesses. Expanding the target market to include businesses would capture additional savings.
Income-Eligible Weatherization Program	N/A	The target market of low-income customers is defined by GMO as both home-owning and renting utility customers who have household incomes below 200% of Federal Poverty Income Guidelines. This market for low-income home weatherization is well-defined and does not need to be consolidated or expanded because in reflecting Federal Poverty Guidelines it properly reflects market realities.
Home Lighting Rebate Program	N/A	The program market segment is appropriately defined as all GMO residential customers buying light bulbs. However, small businesses and landlords of multi-family units may also be purchasing bulbs from retail outlets through the program, and GMO should be aware their program likely serves a broader market than the implied residential-only target market.
M Power	N/A	The target market segment is all commercial customers that are capable of reducing their demand to 25 kW below estimated peak usage when a curtailment event is called between June 1 and Sept. 30 of a year.
Energy Optimizer	N/A	The target market is all residential and small commercial GMO customers with peak demand less than 200 kW and having HVAC systems accessible through installation of a communicating, programmable thermostat. This represents a very large segment of GMO's total residential and small commercial customer markets.

(Sources: Navigant PY2014 EM&V Report, pp. 68, 94, 113, 167, 202, 218, 234, 256, 276, 298, 322, 345)

Table 24: Summary of Findings for 4 CSR 240-22.070(8) Issue #3

4 CSR 240-22.070(8) Issue #3: Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?		
Program	***Original 2013 Response***	**PY 2014 Update**
C&I Custom and Standard Program	The end-use mix provided by the Standard Program is sufficient.	The end-use mix has remained the same; the Standard Program savings were achieved by the same three end uses (lighting, HVAC, and VFDs), with lighting comprising 78% of the *ex ante* savings.
Multifamily Rebate Program	N/A	The mix of measures currently available for rebate under the program appropriately reflect the needs of the target market covering measures for common areas and dwelling units.
Residential Energy Report	N/A	The program recommends steps to reduce energy use that span the typical end uses of residential customers. Every report includes three recommendations for ways to reduce energy use that are selected based on the customer's demographics and any conservation steps taken.
Air Conditioning Upgrade Rebate Program	N/A	The measure mix is appropriate as the program focuses primarily on residential HVAC energy consumption by providing rebates for the purchase of high-efficiency equipment as well as tuning existing units to their most efficient operating condition. In addition, the program incentivizes efficient lighting through CFL bulb giveaways.
		GMO could consider expanding the program to incentivize other HVAC-related measures such as quality installation of HVAC units and duct sealing. Duct sealing is already provided through the Home Performance with ENERGY STAR® (HPwES) Program; however, it could be offered as a stand-alone measure.
Residential Lighting and Appliance Program	The end-use mix of appliances is sufficient. The RLA Program offers rebates for a wide mix of ENERGY STAR-rated appliances. The program should expand to provide the consumer with a broader range of efficient lighting technologies (including CFLs and LEDs) and options (i.e., specialty lamps).	The end-use mix of appliances is consistent with the program design. The program continues to offer a wide mix of ENERGY STAR®-rated appliances. The program should consider including incentives for the purchase of learning (i.e., smart) or Wi-Fi-enabled thermostats and connected appliances in addition to expanding the lighting offering to LEDs.

4 CSR 240-22.070(8) Issue #3: Does the mix of end-use measures included in the program appropriately reflect the diversity of end-use energy service needs and existing end-use technologies within the target market segment?		
Program	***Original 2013 Response***	**PY 2014 Update**
Home Performance with Energy Star®	N/A	The HPwES program contains an appropriate mix of the standard building shell energy-efficiency improvements, including attic insulation, wall and floor insulation, air and duct sealing, and new windows and doors. The program rebates are determined based on the type and quantity of improvements implemented. The program should continue to monitor advancements in energy efficiency and include new measures in the program where appropriate.
Energy Star® New Homes Program	N/A	The ESNH program contains an appropriate mix of measures that reflect the needs of the target market. These include high efficiency heating and cooling equipment, high-performance windows and doors, improved insulation, controlled air filtration, programmable thermostats, tight duct systems, upgraded water heating equipment, and ENERGY STAR® certified lighting and appliances.
Appliance Turn-In Program	N/A	The mix of end-use measures included is appropriate. The ATI program offers recycling services for four qualifying appliances: refrigerators, freezers, dehumidifiers, and window air conditioners. The mix serves homeowners and renters in single-family units as well as in multi-family units.
Income-Eligible Weatherization Program	N/A	End-use measures included in the program include all home weatherization measures typically completed for non-low-income home weatherization projects, and are thus reflective of the full diversity of services and technologies in the home weatherization market.
Home Lighting Rebate Program		The mix of CFL and LED bulbs currently available for rebates under the program appropriately reflects the diversity of bulb options within the efficient home lighting market. The program offers discounts on standard CFL and LED bulbs, as well as specialty products such as flame and globe shaped bulbs and 3-Way bulbs. Many brands and models of CFL and LED bulbs are included in the rebate program, and mix of bulbs is continually monitored and updated by the IC to reflect market realities.
M Power		The mix of end-use measures included in the program appropriately reflects the diversity of end-use energy service needs and existing end-use technologies within the target segment.
Energy Optimizer		GMO offers both commercial and residential DR programs, which cover the diversity of energy service needs and technologies available.

(Sources: Navigant PY2014 EM&V Report, pp. 68, 94, 113, 167, 202, 218, 234, 256, 276, 298, 322, 345)

Table 25: Summary of Findings for 4 CSR 240-22.070(8) Issue #4

4 CSR 240-22.070(8) Issue #4: Are the communication channels and delivery mechanisms appropriate for the target market segment?		
Program	**PY2013 Response**	**PY 2014 Update**
C&I Custom and Standard Program	The C&I Standard and Custom Programs use communication channels and delivery mechanisms that are appropriate for the target market. *Navigant suggests these can be improved to increase program participation in the following three ways: 1) expand outreach efforts to trade allies, 2) provide marketing materials for trade allies to give their customers, and 3) provide program information to trade allies in monthly emails.*	Navigant found the C&I Standard and Custom Programs use communication channels and delivery mechanisms that continue to be appropriate for the target market. *Navigant suggests communication channels and delivery mechanisms can be improved to increase program participation in the following four ways: 1) expand outreach efforts to trade allies, 2) provide marketing materials for trade allies to give their customers, 3) provide program information to trade allies as program updates are made*, and 4) provide trade allies with a mechanism to track application status.
Multifamily Rebate Program		The Multifamily Rebate Program was not promoted or marketed in 2014 due to limited staffing resources and general design issues.
Residential Energy Reports		The RER Program uses two primary communication channels: monthly emails and paper mailers every other month. The timing and frequency of messaging through these channels is appropriate given the need to provide information through multiple mediums over time so participants can monitor the impact of any efficiency and consumption changes they make.
Air Conditioning Upgrade Rebate Program		The program uses a variety of techniques to promote the program to their customers, and the breadth of the material.
Residential Lighting and Appliance Program	The RLA Program uses communication channels that are appropriate for the target market.	Navigant's mapping analysis of participation finds the program attracts participants throughout GMO's service territory.
Home Performance with Energy Star		The HPwES program is primarily promoted through portfolio-wide general marketing materials, such as the Black Friday promotion newsletter. Navigant feels that the program would benefit from a more comprehensive and expansive marketing campaign specifically designed for the program.
Energy Star New Homes Program		The ESNH program was not promoted or marketed in 2014 due to limited staffing and general design issues including the program shift from ENERGY STAR® version 2.5 to the higher efficiency requirements of ENERGY STAR® version 3.0, relatively low rebate levels, and a small network of HERS raters in GMO's service territory.

4 CSR 240-22.070(8) Issue #4: Are the communication channels and delivery mechanisms appropriate for the target market segment?		
Program	**PY2013 Response**	**PY 2014 Update**
Appliance Turn-In Program		The ATI program uses communication channels and delivery mechanisms that are appropriate for the target market. The program communicates through a variety of media including print, radio, bill inserts, and direct marketing.
Income-Eligible Weatherization Program		Communication channels and delivery mechanisms are appropriate for the target market, low-income customers. Low-income customers can access program benefits through their local CAPs. CAPs serve well as liaisons between the communities they serve and the utility. Other communications regarding the program are delivered via the utility's bill messaging, online website messaging, and supplying informative materials to CAPs directly.
Home Lighting Rebate Program		Both communication channels and delivery mechanisms are appropriate for the target market segment: potential purchasers of standard socket light bulbs. The utility notifies customers about program opportunities through direct mailings, radio advertisements, and other methods. The implementation contractor markets to potential customers through in-store events, placement of in-store marketing materials and signage, training of retail staff, in-person advice and guidance to retail shoppers on efficient lighting from field representatives in the store, and community outreach events.
M Power Program		MPower program participants revealed a high degree of confusion about their participation status.
Energy Optimizer		Both communication channels and delivery mechanisms are appropriate for the target market segment. Honeywell handles all communication issues and delivery mechanisms for the Energy Optimizer program. Several communication channels are relevant to program success with respect to the target market segment. First, Honeywell actively markets the program to GMO customers using a direct mail and telemarketing approach.

(Sources: Navigant PY2014 EM&V Report, pp. 68, 94, 113, 167, 202, 218, 234, 256, 276, 298, 322, 345)

Table 26: Summary of Findings for 4 CSR 240-22.070(8) Issue #5

4 CSR 240-22.070(8) #5: What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end- use measure included in the program?		
Program	**PY2013 Response**	**PY 2014 Update**
C&I Custom and Standard Program	Navigant's research indicates that the following changes would be helpful to identified market imperfections: 1) Creating a set of increased incentives targeted at small commercial customers can help the segment overcome the first cost barrier of energy-efficient technologies; 2) Increasing outreach efforts to contractors ; and 3) Providing marketing materials for participating trade allies to give to their customers can address barriers of limited customer awareness.	None
Multifamily Rebate Program		The GMO territory does not have as dense a population normally served by multi-family properties. If GMO chooses (sic) to continue the program, GMO could integrate comprehensive retrofits that address weatherization measures, HVAC systems, and building shell measures with direct install measures that include lighting and hot water measures that are low-cost and easy to install.
Residential Energy Reports		Customer doubt over the validity of the energy use comparison between their household and similar households is a barrier to customer acceptance. Providing evidence of the comparison's validity by specifying the characteristics used may improve customer acceptance and motivate increased implementation of energy saving recommendations. Targeting this evidence at specific demographics would achieve the California best practice of marketing to specific subgroups of interest.
Air Conditioning Upgrade Rebate Program	None	The program can more effectively overcome the market imperfections associated with the adoption of high-efficiency HVAC units by growing and supporting the participating trade ally network.
Residential Lighting and Appliance Program	To RLA Program can consider the following program changes: 1. Move to an instant rebate process that minimizes paperwork and facilitates participation. 2. Offer incentives of a variety of efficient residential lighting measures to all residential customers.	The evaluation staff recommends that GMO consider reevaluating the RLA Program and consider redesigning the program to include emerging technologies such as the smart thermostats, connected appliances, and LED lighting.

4 CSR 240-22.070(8) #5: What can be done to more effectively overcome the identified market imperfections and to increase the rate of customer acceptance and implementation of each end- use measure included in the program?		
Program	**PY2013 Response**	**PY 2014 Update**
Home Performance with Energy Star®		The HPwES program should increase the program marketing. In order to overcome all the barriers, the program marketing materials should promote and explain the program, the benefit of energy-efficiency improvements, and the benefit of working with a HERS rater. The program should also consider extending the timeline for participation in the program or allowing customers to complete the recommended improvements in stages.
Energy Star® New Homes Program		If GMO wanted to continue this program, they could overcome the identified market imperfections with a three-pronged approach: 1) offering larger incentives to builders and HERS raters 2) recruiting more HERS raters in the GMO service territory and 3) providing more education and outreach to customers so they become aware of the long term economic and home-comfort benefits of installing high efficiency equipment. However, this is viewed as not practical at this time due to low program participation and limited resources.
Appliance Turn-In Program		The ATI program can increase customers' awareness of the benefits of recycling large, inefficient appliances through program marketing activities. KCP&L GMO may also consider working directly with appliance retailers to recycle units they pick up when they deliver new units.
Home Lighting Rebate Program		Navigant has identified three potential approaches GMO can take to overcome identified market imperfections and increase participation: 1) Consider additional marketing and outreach for LEDs relative to CFLs, possibly in tandem with higher rebates for LEDs relative to CFLs; 2: Consider providing procurement training and assistance to retail outlets that target low-income customers to encourage reliable stocking and availability of bulbs; and 3) include results in-store intercept to provide better information about and to effectively increase and track the effects of marketing and outreach activities.
M Power		GMO should improve channels of communication with existing participants to reduce attrition and increase satisfaction. A second key market imperfection addressed by this program is the need for demand flexibility to address peak period demands. The program has shown a steady decline in the percentage of its enrollment capacity target met over several years.
Energy Optimizer		However, relatively cheap power combined with sufficient generation capacity have enabled the utility to avoid calling a peak cycling event through the Energy Optimizer program for a number of years.

(Sources: Navigant PY2014 EM&V Report, pp. 68, 94, 113, 167, 202, 218, 234, 256, 276, 298, 322, 345)

4.2 EM&V Auditor's Assessment of Impact Evaluations

Gross Estimates of Energy Savings

Navigant's EM&V Report was significantly improved from last year for both the impact and process evaluations. The findings were clearly stated and the basis of each recommendation was linked to the EM&V findings. More importantly, the impact evaluations for each program identified and corrected significant errors in the program database tracking system, which led to increases in savings for some programs, such as the Income-Eligible Weatherization Program.

Navigant's sampling methods for the M&V efforts for the Custom and Standard programs were well thought out and conformed to industry standards.

However, the EM&V Auditors discovered several significant errors in the draft report that have now been corrected in the final report. Based on the EM&V Auditor's feedback, Navigant also provided fuller explanations for the increase in program goals, especially when these increases meant that the program did not achieve its savings targets.

Net-to-Gross

The NTG methods and overall logic were extremely well designed, analytically sound, and clearly presented. The research employs best practices through the use of "real time" (fast feedback) data collection, year-end surveys to capture spillover, incorporation of both customer and trade ally perspectives, both quantitative and qualitative indicators of program influence, consistency checks, and sensitivity analysis to test different algorithm structures. There were two aspects of the NTG estimates, however, that are worth exploring in more detail:

- ***Trade Ally vs. Customer Free ridership***. It was surprising that the trade ally estimates of free ridership for both the C&I Custom and Standard Rebate Program and the Air Conditioning Upgrade Program were greater than the participant free ridership estimate, particularly since the expectation was that customers may understate the influence of the trade ally and thus overstate free ridership. It would be helpful for Navigant to explore this counterintuitive finding in more detail in the PY2015 report.

Recommendations to Improve Current Impact Evaluation Reports

- Navigant corrected the errors and reconcile the discrepancies between summary and detailed program impact findings.
- Navigant provided more detailed explanations as to the reasons for increases in program targets, especially for the C&I Prescriptive program. This will provide additional context regarding program operations.

Recommendations to Improve Future Impact Evaluation Reports

The EM&V Auditor also developed several recommendations that should be incorporated into all future EM&V reports prepared for GMO. These recommendations are intended to ensure that the presentation of the impact evaluation findings will conform to industry standards and best practices.

For the RER Program it would also be helpful to address persistence in savings from prior years. In particular, it would be helpful to see how savings have changed over time, and at least estimate the percentage that is likely to have occurred even absent ongoing reports (i.e., persistence). The "rule of thumb" seems to be about a 20% decrement annually after reports stop (or 80% persistence).[23]

Navigant should rely on the most current information to complete its future evaluations of the HLR Program. The Home Lighting Rebate Program seems to largely rely on the Ameren Missouri PY2013 LightSavers Impact Evaluation (Navigant PY2014 EM&V Report, p.282), but the Ameren Missouri PY2014 evaluation updated a number of key parameters, including the baseline wattage, the hours of use, and the coincidence factor. While this evaluation was probably not available when Navigant was working on the KCP&P PY2014 report, these updated parameter values should be incorporated, where possible, for the PY2015 report. In addition, the PY2015 evaluation should attempt to incorporate both free ridership and spillover (the proposed intercept approach will largely be limited to a net of freer ridership number), plus should consider whether or not leakage should be deducted based on the program activity in the surrounding service territories.

Evaluators should verify HVAC early replacement for the ACUR Program. A number of other recent studies for early replacement programs have found evidence that units may have been replaced on burnout and not actually qualify for early replacement (Navigant PY2014 EM&V Report, p. 144).

4.3 EM&V Auditor's Assessment of Process Evaluations

Recommendations to Improve the Current Process Evaluation Reports

Navigant revised the process evaluation write-ups to address the issues raised by the EM&V Auditor. Specifically:

- The program names are now reported consistently throughout the report in both the text and the tables, which enhances overall readability.

The findings from the participant surveys should be reported consistently to facilitate comparisons across the entire program portfolio. In the current report, the scale is different so comparisons cannot be made across programs. Therefore, it is still difficult to gauge actual satisfaction ratings given the graph type used in the report. Moreover, the findings are not fully reported for each program in which a survey was completed, as the following table shows.

[23] Khawaja, M. Sami and James Stuart, "Long-Run Savings and Cost-Effectiveness of Home Energy Report Programs," the Cadmus Group, Winter 20145-2015.

Table 27: Summary of Participant Satisfaction Ratings for KCP&L Overall

Program	Percent Reporting "Extremely Satisfied" with KCP&L
C&I Custom & Standard Programs (n=146)- customer	58%
C&I Custom & Standard Programs (n=18)- Trade Ally	Not Reported
Residential Energy Reports (n=583)	38%
Air Conditioning Upgrade Program (n=24)- Trade Ally	Not Reported
Air Conditioning Upgrade Program (n=388)- Participant	75%
Residential Lighting and Appliance Program (n=66)	63%
Residential Energy Reports (n=583)	38%
MPower (n=8)	Not Reported

(Sources: Navigant PY2014 EM&V Report, pp. 80, 106, 119, 201)

Similarly, the percentages of the number of participants who were "Extremely Satisfied" with each program are still not uniformly reported, making a portfolio level comparison impossible. Consistent with industry best practices, process evaluations should always report satisfaction levels to the degree possible as this is a critical metric of program success. Going forward, Navigant should choose a different format for its graphs that clearly indicate the percentage of each reporting or provide these actual percentages in its report. Table 28 provides an estimate of the satisfaction ratings for each program, as the actual percentages were still not uniformly presented in the final report.

Table 28: Comparison of "Extremely Satisfied" Ratings Among Program Participants

Program	"Extremely" Satisfied[24] with Program
C&I Custom & Standard Programs (n=18)- Trade Ally	*38%*
C&I Custom & Standard Programs (n=147)- Participant	*68%*
Air Conditioning Upgrade Program (n=24) Trade Ally	*62%*
Residential Lighting & Appliances (n=66)- Participant	*70%*
Appliance Turn In (n=550)- Participant	*88%*
Residential Energy Reports (n=583)- Participant	*38%*
MPower (n=8)- Participant	*78%*

(Sources: Navigant PY2014 EM&V Report, p. xlvi)

- The evaluators now provided a status report for most of the recommendations made in PY2013. The revised and final document now conforms to industry standards for proper tracking of recommendations.

[24] The actual percentage was not actually reported numerically in the report, so the percentages are italicized to reflect that these are estimates based on the figures in the report. This approach is not consistent with industry standards for data reporting and should be corrected in future evaluation reports.

- The evaluators now matched the 4 CSR Reporting Requirements with the appropriate question.

Recommendations to Improve Future Process Evaluations

Future process evaluations should include the following:

- Status reports of all previous impact and process recommendations from prior evaluations;
- Consistent reporting of the key customer survey findings to facilitate comparisons along key metrics, including customer satisfaction with GMO and overall satisfaction with the program. The survey scales and questions should be consistent across all customer surveys, including both participant and non-participant surveys.
- The 4 CSR Reporting Requirements should address all question elements as designed and updated information from the process evaluations should be incorporated as appropriate.

4.4 EM&V Auditor's Assessment of the Cost-Effectiveness Analysis

Navigant corrected several errors in the report regarding the cost-effectiveness calculations.

- Navigant provided all copies of the assumptions and work papers that were used to derive the cost-effectiveness results.
- Navigant provided clearer explanations regarding the assumptions used to calculate the benefit-cost ratios. In addition, the terminology should be clear to avoid confusion over common terms such as "program."

Recommendations to Future Cost Effectiveness Analysis

Future cost-effectiveness analysis should incorporate the following elements:

- Navigant should include copies of all work papers used to perform the benefit-cost analysis in a separate appendix, including assumptions used for avoided costs, administrative costs, and other critical inputs.
- The cost-benefit analysis should include clear descriptions of the terms used to arrive at the results, and the references throughout the report should be consistent and correct.

4.5 Overall Conclusions from the EM&V Auditor Team

Navigant's EM&V Report was significantly improved from last year for both the impact and process evaluations. The findings were clearly stated and the basis of each recommendation was linked to the EM&V findings. More importantly, the impact evaluations for each program identified and corrected significant errors in the program database tracking system, which led to increases in savings for some programs, such as the Income-Eligible Weatherization Program.

However, some of the information reported in these findings was incomplete or erroneous and these issues should be corrected prior to finalizing the PY2014 report. The specific issues are summarized in Section 4.2 of this report.

With a few exceptions, the process evaluations conformed to industry best practices and the evaluations were significantly improved from the PY2013 reports. The process evaluation findings and recommendations were provided in a clear and organized manner both in the Executive

Summary and in the individual chapters for each program. The findings and recommendations were well-grounded and appropriate for the programs.

Similar to PY2013, the evaluators did not provide sufficient information to assess progress towards meeting the requirements set forth in 4 CFR-240-22-070 (8) for impact evaluations. For the process evaluations, they did provide some new information for some of the programs based on the evaluation findings. However, these analyses were inconsistent as some assessments, especially for the C&I Custom and Standards Program were simply repeats from the previous years.

The final EM&V Report did not report the survey findings regarding satisfaction, both overall satisfaction with KCP&L and satisfaction with the program in a consistent manner. While the data were provided, it was difficult to determine the actual percentages reported for each response, thereby making it impossible to determine overall trends. Furthermore, the figures provided in the report did not separate out the responses by category, but rather grouped them together. Therefore, the EM&V Auditor team had to estimate the percentages rather than be certain of the actual values of these critical program metrics. Going forward, Navigant should use a different graphical format to display these satisfaction ratings, or alternatively, provide them in tabular form to facilitate analysis and conform to industry best practices for reporting.

References

Navigant Consulting, 2015, "GMO Evaluation, Measurement, & Verification Report – DRAFT, Program Year 2014, Prepared for KCP&L – Greater Missouri Operations, April 30.

_____, 2014, "GMO Evaluation, Measurement, & Verification Report – FINAL, Program Year 2013, Prepared for KCP&L – Greater Missouri Operations, July 30.